The Business Journal of Vegetation Management March 1978/$1.25

WEEDS TREES & TURF

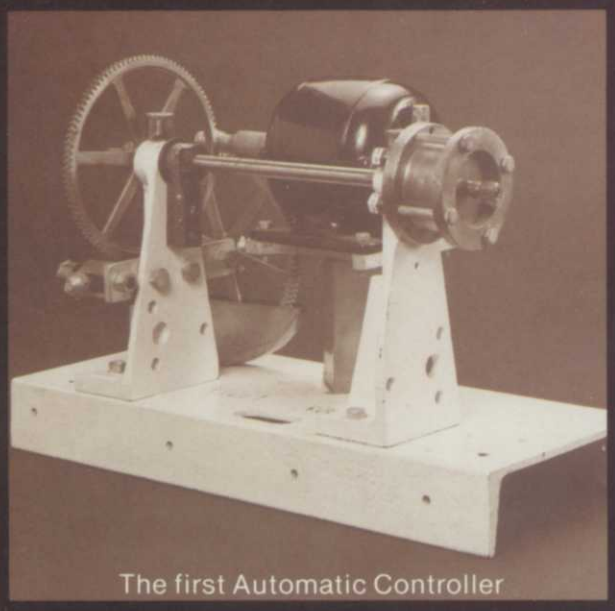
Crab Apples That Can Take It

Chemical Renovation in Large Scale

Revegetation in a Delicate Environment

Johns Manville's Headquarters Site Requires Hand Care

SPECIAL:
Contract Applicator Profile



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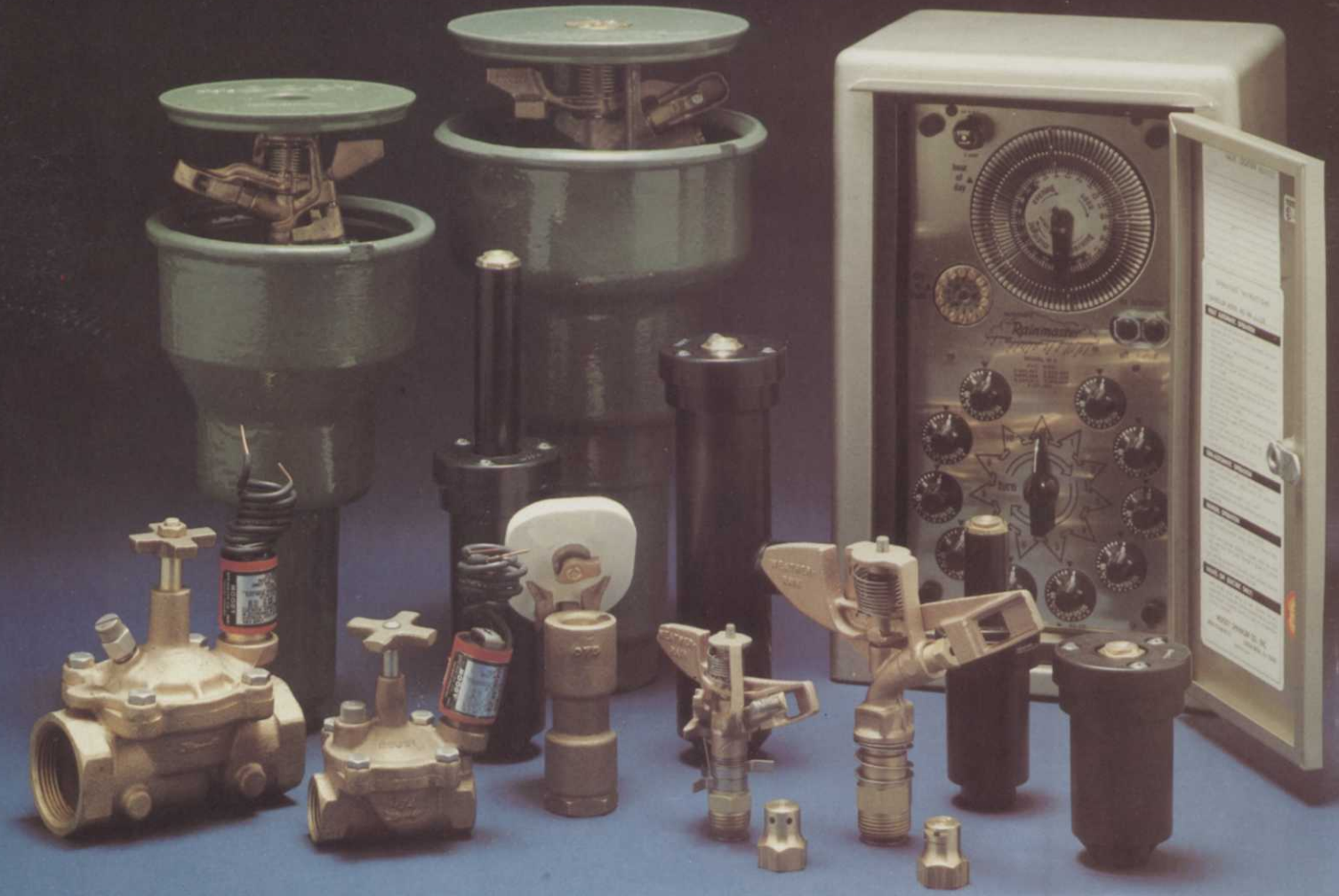

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WT&T

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VIEWPOINT

On February 15, 1978 a national turfgrass federation was created after unanimous approval by individuals who have devoted their lives to the advancement of the various segments of the turf industry. Fred Grau, Tom Mascaro, Jim Watson, Bill Lyons, Gene Nutter and many other headliners of the turfgrass industry voted for creation of the federation.

Weeds Trees & Turf was there and also pledged support to this group and its intended purpose. We hope the bylaws of the new group will assure a cooperative relationship with existing associations and dissolve any personal allegiances of some of the founders.

More people will support the new group when they believe it has no intentions other than to help all associations and all interests in turf. This should be one of the federation's first goals. It is essentially a public relations factor that can spell success or failure at this early stage.

All trade magazines must be fed as much information as possible about the new group. All regional turf associations hopefully will support the cause, after making their own judgment as to the value of the group. Large associations, such as the American Association of Nurserymen and the Golf Course Superintendents Association of America, should assign committees immediately to study the new federation and make official decisions. They should let their members know in their publications and newsletters when a decision is reached.

The concept of the federation is extremely worthwhile and honorable. It is the way in which the federation was promoted in the last six months that represents the primary threat to its existence.

Initially, the group had almost a "property of" stamp on it by another publisher in the turfgrass field. Two meetings were held prior to the GCSAA show with no motion for creation for this and other reasons. In San Antonio, this individual took a different, less noticeable role and the creation was approved. What is sad in a way is that this person truly deserves respect for his efforts but for personal benefit nearly lost all recognition.

The "property of" stamp must be completely erased in the future. If Brantwood Publications becomes the official newsletter of the federation the total value of the group will be lost and the things it could achieve will be hindered by in-fighting and bad public relations.

Lou Greco has a tough job ahead as president. He has volunteered his own time and money and shows strong leadership skills.

Perhaps the factor assuring success the most is the bylaw committee of Dr. Grau, Jim Watson, Jim Beard and Tom Mascaro. They know what's needed and they have the wisdom to avoid any further confrontations.

BRUCE F. SHANK Editor

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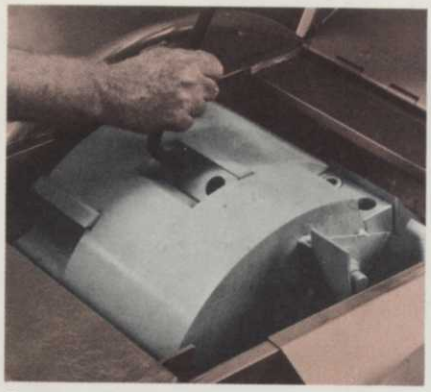

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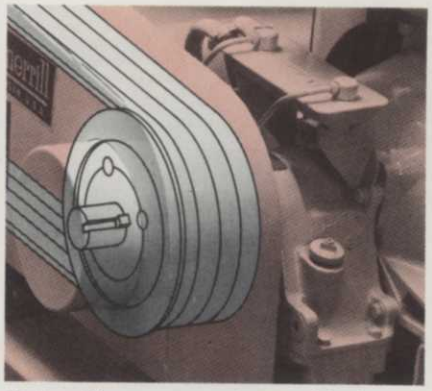

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LETTERS

You can't call them neglected, yet it seems they are taking a back seat. Perhaps by default the vast majority of professionals working in the park and large area grounds management field seem to consistently come in second.

First, despite the fact that there are many more thousands of grounds managers outside golf than in it, turf research still seems orientated toward the golf superintendent (and the home owner) almost entirely. There is a good reason why firms underwriting research, angle grants in that direction — a lot of money is spent by these two groups. In the case of the golf superintendents, they are a well organized "lobby" for their needs in turf. We can't fault this. It is exactly what they should be doing, but perhaps more balance is needed.

The thousands of others in parks and grounds need the best their budgets can buy. For instance, aggressive varieties which can make it without a lot of water, or more varieties resistant to the perils of the city — salt, smog, being badly trampled. And have we given up on growth retardants?

Secondly, in our view, both the park and grounds managers are highly trained professionals. This is not the view of the public. Budgets often put them at the bottom, many times with severe cuts from the committees who should know the vital roles they play. The public feels that their principal function is to cut grass and dispose of refuse.

In the past, many department heads then started at the bottom and hung on until seniority brought them the top job. No more. Your typical park or campus administrator is a true professional with four to six or more years of college level training, plus experience. The problem is an individual one which each administrator must solve.

Public relations is the key. Most administrators rate it low in priority, but the ones who have done a good job of it, have achieved professional status. Good relations with the local press, a record of articles published, awards won, talks presented at state and national conferences all show the professional training and result in raises, promotion and good budgets for the department.

We'd like to see more expertise on the part of the park administrator and a high priority put on "image." It would benefit parks. The same goes for campus and other grounds managers.

Erik Madisen, Jr.
Editor, *Park Maintenance*

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GREEN INDUSTRY NEWS

LANDSCAPE

Contractors gather for Orlando meeting

The 1978 Annual Meeting of the Associated Landscape Contractors of America attracted a total of 653 landscape contractors from across the U.S. and from England, Canada and Scotland. The five day program was held January 29 through February 3 in Orlando, Florida.

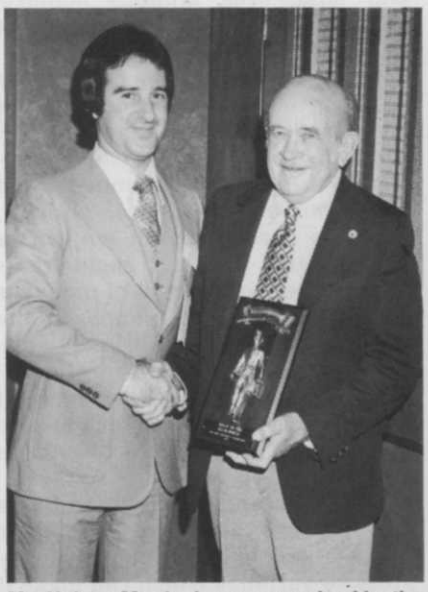
Dr. Alex Mackenzie conducted the keynote session on time management. His opening remarks led to the decision that time management is a misnomer, that time cannot be changed, but rather it is a matter of self management to make the most of the time that is available.

E. Gray Payne discussed accounting, a key element to any business, on Tuesday morning. Tuesday afternoon, the exhibit hall opened. Many favorable comments were heard from exhibitors on the fact that the exhibit hall was open only one afternoon, and that it was well attended by the ALCA members. Exhibitors complain because, often they spend three or four days at a show and everyone has seen it by the second day, with the third or fourth being sparsely attended.

The membership meeting was held Wednesday, with new officers being elected. The 1978 ALCA program was presented at that time.

The environmental Improvement awards were presented Wednesday afternoon. Mrs. Rosalynn Carter sent a telegram to Jim Gibbs congratulating ALCA for encouraging awareness of the importance of individual and community efforts to protect and enhance our environment.

The meeting split into concurrent specialty sessions on Thursday. Sessions on maintenance, interiorscaping, and erosion control gave members an opportunity to determine innovations in their special interest. The sessions continued Friday morning, concluding a well attended ALCA meeting.



Mr. Nelson Monical was recognized by the Ohio Turfgrass Foundation as "Man of the Year" for 1977 for his many years of service to the turfgrass industry in Ohio. OTF president Lou Greco (left) made the presentation.

TURF

National federation is born in Texas

With cautious optimism a group of industry leaders endorsed the creation of a national turfgrass "federation" during the International Turfgrass Conference sponsored by the Golf Course Superintendents Association of America in San Antonio, Tx., Feb. 12-17.

A temporary slate of officers and a committee to write a set of bylaws were chosen during the breakfast meeting.

The original idea of a national turfgrass federation is attributed to Dr. Fred Grau who made the motion for creation and consequently put his idea of 1953 into action in 1978. Richard Morey, publisher of Brantwood Publications, and Dr. Richard Duble, a Texas A&M researcher, are credited for making this latest and presently successful push for a national body to represent turf interests.

The desire is to make the organization resemble the Council on Agricultural Science and Technology, (CAST), a relatively successful and non-competitive organization representing agriculture. Without actually lobbying, CAST gathers data and polls industry leaders regarding topics of critical interest to agriculture. As a result, government officials consult CAST before making decisions on agricultural issues.

Dr. James Beard, well-known author and Texas A&M professor, cautioned the organizers of the federation against taking any kind of competitive stance with other industry associations. Beard recommended the name of council rather than federation for this purpose. "The group needs to have a total industry scope and must not threaten the vested interests of other groups," Beard said.

James Watson of Toro seconded Dr. Grau's motion for creation and was named to the bylaw committee along with Grau, Beard, and Tom Mascaro. The committee will determine how the federation will be funded.

The officers chosen are Lou Greco-president; Gene Nutter-vice president; and Richard Duble-secretary-treasurer.

LANDSCAPE

Firms predict jump in business

Landscape firms are predicting an average 15% or more increase in business across the country this year, according to a survey conducted by the National Landscape Association. Ninety-percent of those responding indicated that they expect increased landscape sales during 1978.

Projections made by NLA members indicated that the strongest sales will be in new residential and commercial landscaping. Residential renovation followed close behind. Only half of the respondents expected increases in commercial renovations.

Three-quarters of the landscape firms indicated bookings in new residential and commercial landscaping. Two-thirds indicated increased bookings for residential renovation landscaping.

The same survey a year ago showed an expected 12% increase in 1977 business over 1976.

IRRIGATION

Toro announces low-cost system

The Irrigation Division of the Toro Company unveiled a method of converting a manual irrigation system to automatic without wires or control tubes during the 1978 Golf Course Superintendents Association of America Turfgrass Conference and Show in San Antonio in February.

The new system was developed by Karl Fry especially for low-income golf courses with quick-coupler sprinklers, but is expected to have application for other large turf areas. The system, called MPC for modulating pressure control, requires modification of the pump house, and that expense will depend upon the present condition of any pumphouse. Pressure regulating valves and a pessure tank are necessary. Once the pumphouse is adequate and the central controller installed, conversion is simply a matter of replacing heads by removal of the quick coupler and replacement with any one of Toro's valve-in-head gear-driven rotary sprinklers and the installation of a cycler at each head.

The controller is a 39-station solid-state electronic one. No electric wiring, however, or control tubing is necessary between the central controller and the sprinklers heads and there are no satellite controllers.

The cycler is the heart of the system. It reacts to pressure changes in the main line to turn the sprinklers on and off. The central controller intercepts the water flow between the pumphouse and each cylinder to determine the starting time and duration of watering for each sprinkler. The cycler contains gears and levers that respond to hydraulic pressure. It has four hydraulic connections, one each that: "reads" the pressure in the piping system, supplies water to the valve through the cycler, and to the valve, and drains the water to open the valve.

A demonstration system was installed at Windcrest golf course in San Antonio, Texas. The pumphouse was completely remodified at a cost of approximately $8,000. Heads were then converted and cyclers installed by the course's maintenance personnel at a rate of 20 per day, with a 200 head conversion complete in 10 days.

The demonstration itself at Windcrest ran very smoothly. It is estimated that there are more than 4,000 low-budget golf courses with quick-coupler manual systems that should be able to afford an MPC system, according to John Skidgel, Toro's golf course/government marketing manager. Full production of the system is expected in early 1979.

TURF

Michigan firm publishes bibliography

A bibliography of turfgrass literature during 1672 - 1973 has been compiled and edited by James Beard, Harriett Beard, and David Martin. The TURFGRASS BIBLIOGRAPHY contains more than 16,000 references listed alphabetically on an author basis. These references are then cross listed in a subject index which contains more than 40,000 entries. Scientific, semi-technical, and popular writings covering all phases of turfgrass science, culture, and management are included.

The Michigan State University Press, a nonprofit organization, has published 1,500 copies. Financial assistance in publishing the book was given by the O.J. Noer Research Foundation, United States Golf Association Green Section Research and Education Fund, The Michigan Golf Association, and The Michigan Seniors Golf Association.

The reference will sell for $35.00. Orders may be sent to Michigan State University Press, Harrison Road, East Lansing, Mich., 48824. Orders will be filled starting June 4.

DISEASE

Extension loss figures top $90 million

The U.S. Cooperative Extension Service has reported an estimated annual loss in the U.S. of $4,670,000,000 as a result of crop, tree, and other plant diseases.

The Agriculture Research Service of the U.S. Department of Agriculture reported that pests, including weeds, cause approximately 30% annual loss in potential production of food and fiber. About 50,000 species of fungi cause over 1,500 crop and animal diseases; over 1,500 nematodes damage crop plants; and more than 10,000 insect species cause serious crop and livestock losses.

NURSERY

Biological waste process developed

Workers at the Biological Waste Management and Soil Nitrogen Laboratory in Beltsville, Md., have developed a method of converting raw or digested, dewatered sewage sludge into compost ready for use in potting mixes and nursery soil in 60 days. the compost has an odor similar to that of normal garden compost. It has a pH of 6.5-7.0 and contains 0.9-1.6% nitrogen, 1.0-1.2% calcium, 1.0-1.2% magnesium, and an abundant supply of trace elements.

Research work has shown that, regardless of the amount of composted sludge blended, pH and phosphorus levels are above optimum. Further study is needed to determine if supplemental potassium will be beneficial.

GOVERNMENT UPDATE

President wants EPA's budget increased

The Carter administration has asked Congress to approve $60.7 million in fiscal 1979 for the Environmental Protection Agency's pesticide programs, a $13.7 million increase which reflects a change in review priorities by the agency, said Robert Wayland, EPA's lobbyist on Capitol Hill.

"We'll direct more of our resources toward the re-registration program," Wayland said, referring to the program where government investigators will review all chemicals approved by the federal government before 1972. Wayland said this period includes "almost all pesticides (now used); virtually the universe" and estimated that 50,000 chemical products would be affected.

He said that preliminary tests already conducted by the agency show that 150 of the 1,500 active ingredients known to make-up chemical products are suspected to cause serious health or environmental hazards. The agency will conduct further tests on the ingredients, including Toxifine, the most widely used ingredient, to determine the safety of all chemical products.

The investigation will also cover the 4,000 pesticides that leave residue on organisms after application, testing for safe tolerance levels.

Wayland said that many pesticides used now had "very minimal testing" before they were allowed to be sold. He estimated that it costs some companies about $5 million today to test its potential products to meet federal government standards.

Besides the re-registration program, the Carter administration also hopes its additional funds for pesticide programs will expedite the registration of 8,500 new products.

The administration has also asked that $9.5 million be given to the Pesticides and Toxic Substances Enforcement Division so that group can expand its state enforcement grant program. The EPA notes that the states will assume many of the enforcement functions now under federal supervision in 1979.

EPA administrator Douglas Costle indicated that the Carter requests will improve the agency's aim to provide a cleaner and safer environment. "Our budget request for 1979 is a dramatic reversal of the last six years' inadequate support for the protection of the environment," he said.

State registration questioned by GAO

A General Accounting Office report has found that some states have misused their pesticide registration authority by registering pesticides which had previously been suspended or canceled by the Environmental Protection Agency, those that required food tolerance levels not yet set by EPA, and others that EPA feels can cause unreasonable environmental effects or just don't perform well.

The report said these violations of FIFRA occurred because some states intentionally misused their authority or that EPA certified states that are incapable of following the law.

The report, requested by Senators Ted Kennedy (D-Mass.) and Jacob Javits (R-N.Y.) members of the Senate subcommittee on Health and Scientific Research, concluded that states should not be able to register pesticides not approved by the EPA. It also said violators should be fined or their registration authority suspended.

Although the House of Representatives has voted to allow states to determine pesticides for special local needs, GAO recommends that EPA maintain its review authority and also work to uncover those pesticides used which have not been approved at the federal level.

TURF

Musser Foundation takes funding action

The Musser International Turfgrass Foundation voted to hire a professional estate planner/fund gatherer at its meeting during the GCSAA Conference in San Antonio, Tx.

William Lyons will be in charge of the fund raising effort which is financed by a $1,000 grant from board member Hugh Chronister representing Harvest Publishing Co.

The Musser Foundation gives financial grants to turf students. One grant to an Ohio student has resulted in a major discovery of the life cycle of the extremely destructive Ataenius beetle.

The Foundation, under the direction of Dr. Fred Grau, wants to expand its scholarship work by broadening its financial base through memorial contributions and gifts.

REGULATION

EPA announces restricted list

The federal Environmental Protection Agency has announced its official list of restricted use pesticides — those that can legally be used only by certified applicators.

Of the 23 pesticide ingredients on the restricted-use list, none are used extensively in turf, but some are used in tree and ornamental work. They are:

Aldicarb, marketed by Union Carbide Corp., San Francisco, under the trade name Temik for insect control on ornamentals.

Allyl alcohol, marketed by Don Chemical Co., Midland, Mich. for use on nursery seed beds.

Azinophos methyl, marketed under the trade name Guthion by Chemagro, Kansas City, Mo. for insect control on ornamentals and shade trees.

Demeton, marketed by Chemagro under the trade name Systox for control of aphids and mites on ornamentals.

Methomyl, an insecticide for ornamental use marketed as Lannate by DuPont Co., Wilmington, Del. and

Continued on page 103

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PEOPLE

The California Association of Nurserymen has elected **Lewis F. Van Buskirk** to serve as the group's vice president.

President of Van's Greenbriar Nursery in Stockton, Van Buskirk has served as Superior Chapter President of C.A.N. twice, and has been a chapter board member for 10 years, state board member for 7 years, chairman of the Legislative Committee and the Retail Owners Committee, and has served on the Market Development/Public Relations Committee for two years. He was named Young Nurseryman of the Year in 1971.

James D. Beaton

Pam Fay has joined FMC Corporation's Outdoor Power Equipment Division as product manager for Bolens front and rear engine rider products. She will also have responsibilities in the area of business planning.

Fay has held several planning positions with the Chemical Group of FMC Corporation in Philadelphia. Prior to joining FMC, she was an associate brand manager for the Scott Paper Company.

Fay holds a B.A. in mathematics and a Masters Degree in Operations Research, both from the University of Pennsylvania.

Pam Fay

John E. Mitchell, executive vice president of Massey-Ferguson Limited, has announced the appointment of **Kenneth E. Glass** as president of Massey Ferguson Inc., the U.S. operating subsidiary of Massey-Ferguson Limited, and as general manager of the company's North American Operations. Mitchell will become chairman of Massey-Ferguson Inc.

Glass held senior appointments both in North America and Europe with Allis Chalmers and Fiat Allis before joining Massey-Ferguson.

Kenneth E. Glass

Jeffrey J. Dreazen has joined the Harvest sales staff. He will be responsible for the Kansas City and Chicago territories for WEEDS TREES & TURF. Jeff will operate out of the Chicago Harvest office at 333 N. Michigan.

The promotion of **Steve Barber** to manager of Marketing Services for the Davis Division of J I Case was recently announced by C. M. Simpkins, General Manager of Marketing. Barber has been with the Davis Division the past four years as a territory manager of Marketing Services.

Barber will be responsible for coordinating and supervising sales promotion plans, advertising and product training programs, and will work closely with new product development, according to Simpkins.

Linda M. Stutz

Dan Dunstan has been appointed vice president, secretary and chief operating officer of Lakeshore Equipment & Supply Co. His responsibilities will include overall management of the company.

Credit manager for Lakeshore for two years, Dunstan is a graduate of The Ohio State University, with a degree in accounting.

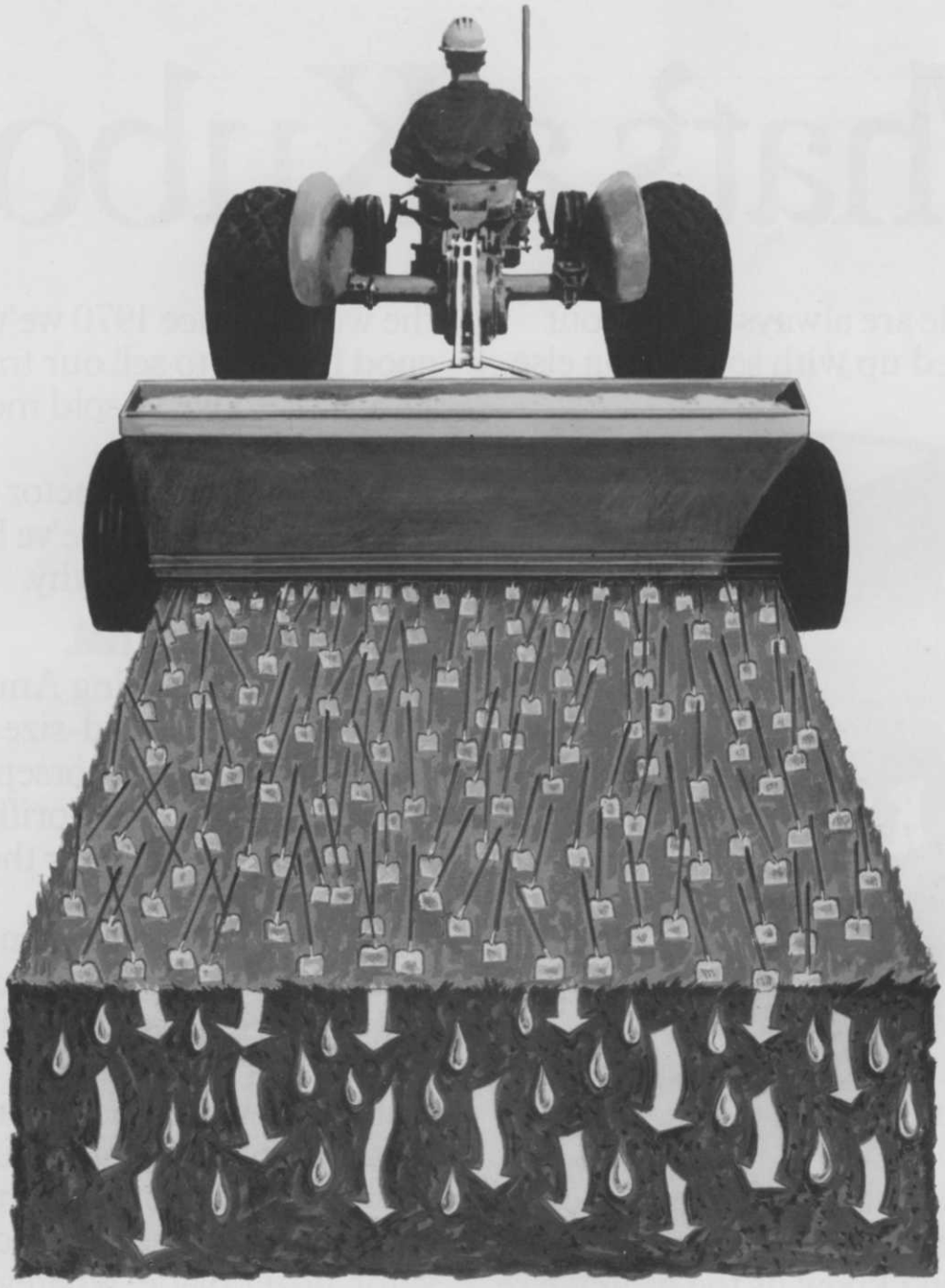
The New York State Nurserymen's Association has elected **Alfred Krautter,** Sprainbrook Nursery in Scarsdale, to serve as president for 1978. **Henry Weller,** Congdon & Weller in N. Collings, has been elected 1st vice president and **Jack Lander,** Jack Lander's Landscaping in Newburgh, has been elected 2nd vice president.

Also elected to office were **Arthur H. Steffen,** Arthur H. Steffen, Inc., of Fairport, as treasurer; **Frank Ferraro,** Bianco & Ferraro in Washington Mills, as secretary; and **George Schichtel,** Schichtel's Nursery in Orchard Park, as director-at-large.

Rohm and Haas Company has announced the appointment of **Linda M. Stutz** as Advertising manager for its Agricultural Chemicals Business. Stutz will be responsible for all aspects of communications for the Company's line of pesticides, spray adjuvants, enzymes and micronutrients.

Stutz holds a B.A. from Temple University and is currently doing graduate work in business administration at the Wharton School of the University of Pennsylvania.

Dr. James D. Beaton, chief agronomist of Cominco Ltd will become Director of the Potash/Phosphate Institute programs in Western Canada, Montana, Idaho and Washington. "Dr. Beaton is a well known authority in soil chemistry and fertility," according to Dr. R. E. Wagner, Institute president. "His work has been outstanding in three areas. In studying the behavior of different fertilizer materials under different soil conditions, in developing and evaluating new, improved fertilizer materials, and in communicating the results to farmers, dealers, and fellow scientists."



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CANYON BUILDING SITE PRESENTS UNIQUE REVEGETATION CHALLENGE

An unusual location for a building and a near disastrous landslide were just two of the many challenges of a revegetation project carried out for Johns-Manville Corp. in a canyon area 15 miles southwest of Denver.

The approach to the corporation's world headquarters follows Deer Creek Canyon, a very narrow but short canyon piercing the front range hogback. The hogback is a geologic formation of immense red sandstone monuments providing a spectacular transition from the eastern plains of Colorado into the foothills of the Colorado Rockies.

The vegetation on the project site further illustrates the transition from plains to mountains. Gambel's Oak, Mountain Mahogany, Rabbit Brush and Four-wing Saltbush are native to this area. The dominant grasses are Buffalograss, Blue gramma, Western Wheat, Crested wheatgrass and Smooth brome. Rocky Mountain Juniper and Ponderosa Pine are the dominant trees on dry, well-drained soils while some aspens are present at higher elevations, along drainage collection points.

In this setting of magnificent geologic forms and earthen hues the architects, The Architects Collaborative Inc. (TAC), engineered a building utilizing materials made by Johns-Manville.

The natural setting and building design utilize the difficult concept of contrasting two immense visual features without subjugating either element. As a result, the beautifully strong sandstone forms and piercing clean lines of the building offset each other in spectacular fashion.

To achieve this concept in design the two primary elements must stand alone without visual interference from lesser features in the landscape. One such feature interfering with this concept was

Workmen roll out netting by hand so as not to disturb the relatively loose soil structure of the canyon wall.

For ad on preceding page circle 120 on free information card

the extensive slide area directly behind the headquarters.

After site preparation had been completed by the general contractor, a massive 200,000 cubic yard landslide occurred requiring this additional material to be incorporated into the building site and road construction. The landslide left behind a tremendous scar creating severe erosion and slide potential, as well as visual interference with the design concept.

Randall & Blake, Inc., at the direction of TAC, provided expertise to achieve the following goals as related to the slide area:

—Reduce the visual disturbance to a minimum.
—Prevent surface erosion.
—Reduce massive slide potential.
—Reduce maintainance to a minimum.
—Provide forage for resident wildlife.

A helicopter delivered all supplies to men on the project in four hours flight time.

Scar left by landslide prior to revegetation.

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Workmen on hillside unload materials brought to the site by helicopter. Use of the helicopter preserved the slope from additional wear.

As a result of the massive landslide, sensing probes were placed in the slide area to monitor movement of the hillslide to forewarn site managers of further slide potentials. A thorough study of the situation placed several constraints on the ensuing revegetation project.

The use of heavy equipment in this area was prohibited because it could further deteriorate slope stability. The erosion control medium could not allow moisture accumulation and subsoil percolation increasing slide potential. Access road construction was prohibited because of increased substrata disturbance as well as visual disturbance. Placement of topsoil was economically prohibitive and could increase slide potential.

Common Name	Application Rate pounds pure live seed per acre
Crested Wheatgrass	7
Intermediate Wheatgrass	3
Western Wheatgrass "Arriba"	6
Smooth Bromegrass	4
Blue Grama	6
Buffalo Grass	4
Annual Rye	2.5
Cicer Milkvetch	2
Mountain Mahogany	1.5
Sagebrush	.5
Rabbit Brush	1.5
Total PLS Pounds/Acre	38.0

Three alternative methods of revegetation were developed. Two of the methods revolved around hydroseeding the slopes and then applying a cover of wood fiber hydromulch. A helicopter would be utilized to provide access by hoisting the hydromulcher and hovering over the slide area.

After consideration of these two methods, their total cost, and potential success, a third alternative was recommended by Randall & Blake.

All seed was broadcast by hand during the spring, except the last three forbes (herbaceous plants other than grass) which were incorporated in the fall seeding period. Fertilizer with 50 pounds of available nitrogen per acre in the form of slow release was distributed by hand, as well as 1.5 tons of hay mulch per acre.

"Conwed Economy Netting" was installed as per manufacturer's recommendations but a longer and sturdier staple was substituted due to the rocky, unstable soil conditions. Finally, 1000 seedling Rocky Mountain Junipers and Gambels Oak were planted.

A second seeding in the fall utilized the same seed and fertilizer rates.

The cost of this method versus hydromulching was substantially less with the same potential success of meeting all prescribed goals.

Due to the constraints mentioned and the fact the slide area constituted a rise in elevation of 850 ft. with a run of 1350 ft., Randall & Blake incorporated the use of a helicopter to transport material to strategic locations to minimize material movement and thus excessive labor costs.

All materials were transported to the parking area at the base of the slide area. Two cargo nets with hook assemblies, eight men loading nets alternately and four men unloading at the pre-planned

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Jot Carpenter (Left), Pres.-Elect of A.S.L.A., and Dick Brickman (Right), Pres. of ALCA, present the ALCA Environmental Improvement Grand Award to Rick Randall, of Randall & Blake, for his firm's reclamation project at the Johns-Manville World Headquarters Building in Colorado. This was one of thirteen Grand Awards presented at the Eighth Annual Environmental Awards Luncheon, held on Feb. 1st, at the ALCA Annual Meeting in Orlando, Florida.

points provided a smooth and continuous placement operation. With this system of operation 13 tons of hay, 11 rolls of netting, 370 lbs. of seed, 6.5 tons of fertilizer, and 80 boxes of staples were transported using only 6 hours helicopter time. Installation of seed, fertilizer, mulch and netting required 480 hours of labor time.

A fall seeding and fertilization program the first year completed the project with a stand of grass establishing itself fairly well on a site composed mostly of rocky subsoil.

The following spring, 1977 indicated a continuation toward a permanent stand of grass. The summer moisture was well below average, inhibiting optimum growth, but a survey of the slope this past fall showed a remarkable tenacious stand of grass. With a good winter and normal spring the slope will be very near to appearing much like the surrounding area.

In summary, the landslide revegetation project met all the goals set prior to construction. The slope no longer appears as a stark reminder of a nearly disasterous slide. The building lays against the foothills in grandeur overlooking the inspiring sandstone formations of the front range hogback.

A hike up the slope will illustrate the presence of a deer population through pellets and split hoof prints. Erosion is minimal and percolation will not become a problem due to the slope and vegetative association.

"The site conditions, soil, slope and aspect challenged our company (Randall & Blake) as no other site has and we feel the success in installation will be followed by an enduring natural vegetation enhancing the architectural design." **WTT**

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Malus sargentii

Malus floribunda

CRAB APPLES CAN BE BOTH BEAUTIFUL AND TOUGH

By Douglas J. Chapman, Horticulturist, Dow Gardens, Midland, Michigan

Crab apples are an extremely popular small tree, filling a unique place in the landscape, with outstanding flower color in the spring and good fruiting during the autumn. There are some 200 cultivars available in the trade, but due to susceptibility to apple scab and fireblight, the list of actively-grown cultivars should be drastically adjusted. The following 15 varieties of crab apples show a high degree of resistance to apple scab and fireblight while being aesthetically outstanding. These should be divided into white and pink flowering forms.

The white flowering forms to be discussed are *Malus* 'Beverly,' 'White Angel,' 'Mary Potter,' 'Red Jewel,' 'Snowdrift,' 'White Cascade,' *M. hupehensis, M. Floribunda,* and *M. sargenti.*

'Beverly' Crab Apple is an upright, oval tree, reaching 25 feet at maturity. This annual flowering plant produces dark red buds which break into clear single white flowers. The small red fruit are quite colorful during the fall months.

'White Angel' Crab Apple has outstanding white flowers. The summer foliage is dark green which contrasts the small dark glossy red fruit during the fall. At maturity its habit is somewhat round, reaching 20 feet in height.

'Mary Potter' Crab Apple's unique horizontal branching habit separates it from any other crab apple. Its ultimate height is 12-15 ft. This profuse producer of clear white flowers and dark red fruit (½ in.) makes it an outstanding specimen tree.

'Red Jewel' Crab Apple is a recent introduction of American Garden Cole which holds its small (½ in.) hard bright red fruit into February and March, providing good winter color. This crab apple's mature habit of growth is an upright, oval tree, reaching 15-18 ft., with slightly horizontal branching. The clear white flowers produced annually are quite attractive.

'Snowdrift' Crab Apple is exciting in its annual profuse display of clear white flowers. When in flower, this plant is outstanding as a single specimen or in mass plantings. For a crab apple, this cultivar is a large tree, reaching 25 ft. in height. This vigorous plant requires little annual pruning to maintain its dense oval shape. The small orange-red fruit (⅜ in.) is effective for only a short period of time.

'White Cascade' Crab Apple, another recent introduction, is one of three good pendulous forms. At maturity this plant reaches only 12-15 ft. in height, but is outstanding as a weeping tree. The white flowers complement the unique growth habit. The small (¼ in.) lime-yellow fruit of 'White Cascade' make it one of the few good yellow fruiting forms.

Tea Crab Apple *(Malus hupehensis)* has a somewhat vase shape, reaching 25 ft. in height. This plant has been grown in the trade for many years but, with its unique habit, white flowers, and red fruit, is still useful in the landscape.

Japanese Crab Apple *(Malus floribunda)* is an outstanding specimen crab apple. This round dense tree reaches 25 ft. at maturity. This plant continues to show outstanding disease resistance. Annually *M. floribunda* produces pink buds which at full bloom has clear, white flowers. The yellow-red fruit developing in the fall is another unique characteristic of this outstanding crab apple specimen.

A few crab apples show a high degree of resistance while being aesthetically outstanding

Sargent Crab Apple *(Malus sargenti)* is the original and, for many years, only dwarf crab apple, reaching only 8 ft. in height. Biannually it produces good clear, white flowers and small, dark red fruit. The fruit of this plant is among the first to mature and seems to be a primary food for birds, reducing its effectiveness for color.

The outstanding pink and red crab apple varieties include *Malus* 'Adams,' 'Liset,' 'Profusion,' 'Coralburst,' and 'Candied Apple.'

'Adams' Crab Apple at maturity has a somewhat round habit of growth, reaching 25 ft. in height. The dark pink buds open to a clear, pink flower. The carmine-red fruit developing in the fall make this one of the truly showy trees for mass planting.

'Liset' Crab Apple has a somewhat upright or vase shape habit of growth, reaching 20 ft. at maturity. Annually this variety produces good dark red flowers. The new growth, also being somewhat red or maroon, prolongs the period of color through early summer. The dark crimson fruit (½ in.) is somewhat contrasted against the dull green foliage, making this a good specimen tree.

'Profusion' Crab Apple is the purplish or red flowering complement to Japanese Crab Apple. This plant, which reaches 25 ft. at maturity, is outstanding as a specimen plant with good, dark oxblood-red fruit developing in the fall.

Continues on page 30

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Crab Apples *from page 27*

'Coralburst' Crab Apple is a recent introduction with a somewhat dwarf, twiggy habit of growth. This plant annually produces an abundant quantity of clear pink flowers which make this an outstanding shrub or tree on a standard.

'Candied Apple' Crab Apple is a somewhat weeping or pendulous variety, reaching 18-20 ft. in height. It annually produces large purplish-pink flowers. During the fall months, the large dull red fruit (½ in.) are somewhat obscured by the normal foliage color.

Tschonoski Crab Apple *(Malus tschonoski)* is more appropriately a specimen or street tree. It is a narrow, upright growing tree which reaches 25-30 ft. in height. It rarely flowers or fruits but has silver-green foliage in the summer with an outstanding maroon fall color. The plant is clearly in a class by itself with little flowers or fruiting but, for those interested in minimum maintenance and fall color, it integrates well as a specimen tree.

Today, the above limited list of crab apples are among the most outstanding cultivars of this colorful small tree. They all show good resistance to apple scab and fireblight, but we must be continually evaluating these and new varieties as resistance breaks down due to overplanting or simply new virulent forms of apple scab and fireblight. There is always room in the trade and landscape for new varieties. **WTT**

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Choose from either Wettable powders, flowables or SEVIMOL® 4, a liquid blend of SEVIN and molasses. Granules, dusts and baits are also available for certain specialized uses.

PLANTS	INSECTS CONTROLLED
HERBACEOUS ANNUAL, BIENNIAL AND PERENNIAL PLANTS such as carnation, chrysanthemum, gladiolus, iris, peony, zinnia, etc.	blister beetles, boxelder bug, flea beetles, Japanese beetle, June beetles, lace bugs, leafhoppers, leaf rollers, mealy bugs, plant bugs, psyllids, rose aphid, thrips (exposed).
SHRUBS, TREES AND WOODY PLANTS such as ash, arborvitae, azalea, barberry, beech, birch, boxwood, catalpa, cedar, cypress, dogwood, elm, euonymus, fir, ginko, hackberry, hawthorn, holly, honeysuckle, hydrangea, juniper, lilac, magnolia, maple, oak, pine, redbud, rose, spruce, sycamore, tulip-tree, etc.	apple aphid, bagworms, birch leaf miner, boxelder bug, boxwood leaf miner, cankerworms, catalpa sphinx, Cooley spruce gall aphid, Eastern spruce gall aphid, elm leaf aphid, elm leaf beetle, elm spanworm, eriophyd mites, gypsy moth, Japanese beetle, June beetles, lace bugs, leafhoppers, leaf rollers, mealy bugs, mimosa webworm, oak leaf miner, orange striped oakworm, orange tortrix, periodical cicada, plant bugs, puss caterpillar, rose aphid, roseslug, saw flies (exposed), scale insects, spruce needle miner, tent caterpillars, thorn bug, thrips (exposed), webworms, willow leaf beetles, yellow poplar weevil.
LAWNS, TURF	ants, bluegrass billbug, chiggers, chinch bugs, cutworms, earwigs, European chafter, fall armyworm, fleas, green June beetle, leafhoppers, millipedes, mosquitoes, sod webworm (lawn moths), ticks.

NOTE: SEVIN will injure Boston Ivy, Virginia Creeper, and Maidenhair fern.

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That's why SEVIN carbaryl insecticide is the answer for the grounds maintenance professional.

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CHEMICAL RENOVATION ON LARGE COLLEGE CAMPUS

When Charles Craig became the horticulturist for Mercer County Community College, Trenton, N.J., in 1976, he inherited 35 rolling acres of coarse grasses and broadleaf weeds. Fearing erosion problems and faced with a limited budget, Craig investigated "no-till' renovation, a new practice at the time.

Craig enlisted the help of Dr. Henry Indyk, extension specialist in turfgrass management at Cook College, Rutgers University. Together, Indyk and Craig planned and carried out a renovation program using Monsanto's Roundup. Their results were presented at the New Jersey Turfgrass Expo at Rutgers last fall.

While studying his alternatives, Craig received a quote from a local landscape contractor with the following rates: 35 cents per square yard for reseeding and mulching and 16 cents per square foot for sodding. These rates included all required tillage and fertilizer for both methods, plus initial watering. The cost for reseeding all 35 acres totalled $59,290 and $243,939 for sodding.

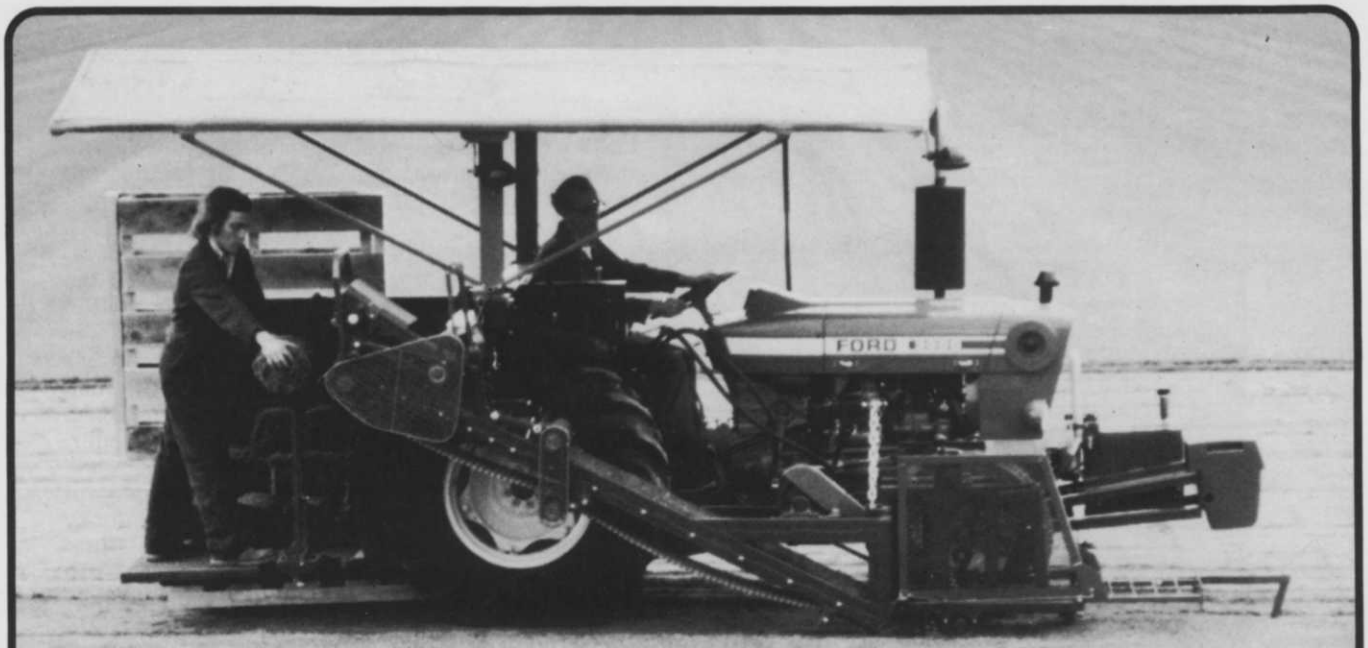
Indyk suggested chemical renovation. "I'd done a little plot work on chemical renovation and had followed the results of other tests. I'd seen enough to convince me that it could be the answer to Charlie's problems." A factor in the selection of Roundup was it was barely out of the experimental stage and Indyk saw the opportunity to try the product on a previously untried large-scale basis.

"When Indyk and I discussed the idea, we agreed that if it failed, we'd probably have to hide under a rock," Craig recalls. "From early September, when all we had was acres of brown stubble, I felt like I was hanging by my thumbs. Explaining what was going on became almost a full-time job." By November the suspense was over and the need to explain ended.

Roundup offers control of existing vegetation without residual action in the soil. Applied on actively growing vegetation, the herbicide is absorbed through the leaves and translocated into the plant's root system, so it destroys the entire plant, including the reproductive root systems. Because there is no residual soil action, turfgrasses may be seeded a few days after the chemical's application.

The herbicide was custom applied on August

Charles Craig, (above) Mercer Community College Horticulturalist.
Dr. Henry Indyke, (right) turf specialist at Cook College, Rutgers University.



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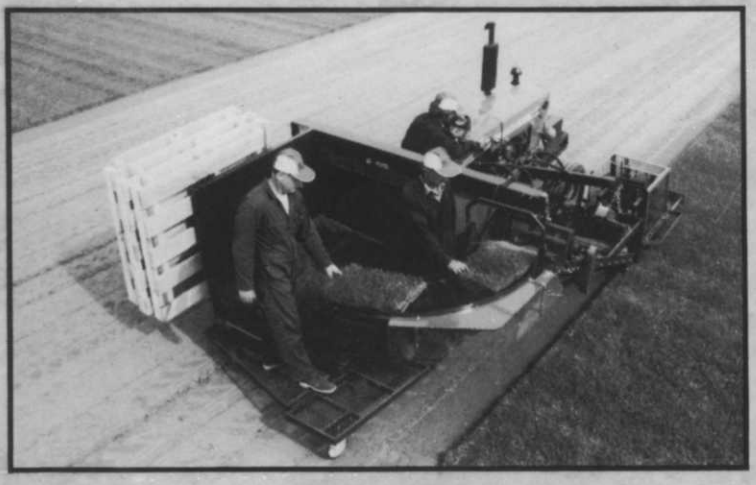

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Applicator prepares boom to spray Roundup on part of the 35 acres.

15. Weed and grass species present included bentgrass, orchardgrass, quackgrass, tall fescue, red and white clover, dandelions, plantain and nutsedge.

Control was complete. "The only places that required follow-up treatment were those spots the sprayer had missed," Indyk notes. Those missed areas were then spot-treated on August 22.

Seven days after the spot treatment, Craig's crew vertigrooved the soil to a depth of ½ to 1 inch and seeded a recommended turfgrass mixture. They used a Jacobsen 548 Aeroblade and seeder, cross-seeding to obtain a faster knit.

The turfgrass mixture contained 35 percent Kentucky Bluegrass; 25 percent Baron Kentucky Bluegrass; 10 percent Majestic Kentucky Bluegrass; 10 percent Jamestown Chewings Fescue; 10 percent Diplomat Perennial Ryegrass and 10 percent Yorktown Perennial Ryegrass. Seeding rate was 2 to 2½ lbs. per 1,000 square feet.

Rolling or dragging with a mat can be beneficial after such a no-till seeding, Indyk points out. But in this instance he did not feel it was necessary.

"I was confident we had the Aeroblade properly adjusted and were getting good seed-soil contact," he explains.

If possible, such a new seeding should be kept moist with frequent irrigation, Indyk adds. Since light rain fell every week, Craig was relieved of that requirement.

After seeding, germination started in about five

An Aeroblade and cross-seeding were used prior to seeding to help obtain a faster knit.

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days, but there was still the long wait to see whether the new seeding would take hold and cover the ground. Meanwhile, the students and faculty were arriving for the fall term and there were lots of questions about the condition of the turf. But by the end of October the new growth had taken hold and Craig and Indyk knew their experiment was successful.

Summing it up, Craig lists his main costs as $5,-950 for herbicide and grass seed. Other costs included custom application of the herbicide and labor and machinery costs for seeding performed by his own crew.

"It's difficult to compute the exact cost per acre," Craig says. "But it's safe to say that if this method had not been available, we simply could not have afforded to renovate those 35 acres with our limited funds and manpower."

The new seeding also received fertilizer, of course. But Craig points out that the fertilizer cost should not necessarily be considered as a renovation cost since he normally fertilizes turf at that time of year anyway.

A soil test had shown pH levels to be adequate and recommended an application of 600 lbs. per acre of 50 percent organic 10-6-4. Wet soil conditions prevented making the recommended preplant application, so Craig shifted to a post-emergence treatment. He reduced the amount to 400 lbs. to guard against burning of the young seedlings.

During the course of the renovation, Indyk and Craig concluded that the process offers some other advantages in addition to cost savings. "Since you don't have to till, the soil remains firm, making better conditions for subsequent machinery operations such as seeding," Indyk observes. "When you till, there is a certain period of time before the soil firms up. And killing the existing vegetation with a herbicide, rather than turning it under, automatically provides a mulch to protect the soil and creates better conditions for the seed to germinate."

"Avoiding plowing, disking and raking saves a lot of time and labor," Craig says. "And since you don't till, there are no rocks or buried weed seed brought to the surface. Also, with Roundup, you destroy the entire plant, including deep-growing roots and rhizomes that you can't get with a plow or rototiller.

Naturally, Craig and Indyk point out, areas of poor growing conditions caused by compaction, shade or inadequate drainage must be corrected before renovation is begun. On one old construction road where compaction was a problem, they plugged and added topsoil. In a low area, too deep to build up with topsoil, they used a posthole digger to drill vertical cores into the subsoil, which they then filled to ground level with ¾-inch clean stone. With the problems corrected, renovation was successful in both places. **WTT**

IT'S WAR

The Ataenius Beetle attacks by night leaving golf courses battle scarred in their wake.

No turf or course is immune to assault and the right chemical to dispose of the Ataenius effectively and legally is still being researched.

The cost to a golf course chosen as an attack site can be phenomenal, the damage devastating. As in any declared war, emergency funds are urgently needed to destroy the threat once and for all.

"The situation is serious," says Dr. Fred V. Grau, president of the Musser Foundation, "and is bound to get worse."

With your help the battle can be won, hopefully before your turf becomes a victim of war.

Contributions to combat the Ataenius could save millions of dollars of unnecessary repair work.

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The Greensaire II hole is precise. It won't affect the roll of a golf ball, so your green is back in play sooner. You can aerate most greens in 45 minutes or less.

And when you use the Greensaire II, you can also use the unique Ryan Core Processor attachment. It catches the cores, separates good soil from debris, puts the good soil back on top, and bags the debris. You aerate, top dress and collect thatch in one operation.

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roots and travels up to the leaves. This 'upstairs/downstairs' action gives excellent control of many problem weeds. Examine the whole line of Banvel® herbicides. We'll give you the highlights here, but your Velsicol Turf Distributor can provide complete information.

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WT&T

PROFILE

THE CONTRACT APPLICATOR MARKET

Roundup®. There's no better grooming aid for unruly turf.

Roundup® belongs in your turf renovation program.

Renovation of a weedy fairway, sod farm or other grassy area used to be a laborious and time-consuming chore, but not any more.

Not with Roundup® herbicide by Monsanto. Because one application of Roundup will control many annual and perennial weeds, yet allow you to proceed with tillage and planting operations as soon as seven days later.

Roundup also makes sense wherever treatments for grounds maintenance are called for. One man with Roundup in a backpack sprayer can replace many of the herbicides and frequent repeat treatments that are often necessary.

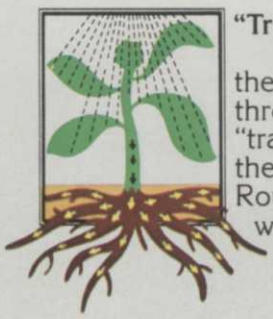
Roundup has no residual soil activity.

That's why you can go in seven days later and re-plant. Roundup won't wash, leach or volatize from the treated area to injure desirable vegetation. Naturally, normal precautions should be observed to avoid spray drift.

Roundup gets to the root of the problem.

Including many of your toughest vegetation problems, like: bluegrass, bermudagrass, quackgrass, bindweed, johnsongrass, fescue and vaseygrass.

Can you afford to let another season go by without Roundup in your turf renovation and grounds maintenance programs? Your local chemical dealer is the one to see for your supply of Roundup herbicide.



"Translocation" is the key.

Roundup is applied to the weed foliage, absorbed through the leaf surface, and "translocated" throughout the entire plant. In this way, Roundup destroys the entire weed, including the roots or rhizomes.

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Monsanto

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RI78-04

WEEDS TREES & TURF SURVEYS THE CONTRACT APPLICATION MARKET

WEEDS TREES & TURF conducted a readership survey of our readers involved in the contract applicator business. Of those readers, 87% were involved in ground application of chemicals. Six percent did aerial application and seven percent were involved in both ground and aerial.

We found that our readers in this category handle approximately 3,000,000 accounts, covering some 380,000,000 acres. The annual gross revenue from contract spray application was projected to be 921,000,000. The median was $40,000 in a range of answers from $300-$10,000,000.

The businesses themselves ranged in age from new to 70 years, with the average age being 17 years.

Most of these businesses have 1-3 employees, however, some employ as many as 200. The average annual salary of these people was $12,040. This figure was inflated somewhat by single owners of companies, who tended to pay themselves very well. The median salary was $10,500.

Sixty-eight percent of the employees were company trained. Only 22% of the employees were college

What types of contract chemical application service does your company provide?

Type of application	Percentage performing this type of application
Residential lawns	70
Commercial property	68
Industrial property	56
Municipal	14
Agriculture	13
Utility Rights-of-way	13
Nurseries	13
Golf courses	13
Orchards	11
Tree farms	8
Highway rights-of-way	8
Railroad rights-of-way	7
Sod farms	5

Type of Applicator	Percentage of contractors using that type
Liquid tank spray truck	74
Dry spreader	48
Boom sprayer	23
Mistblower	10
Aerial	10
Hand sprayer	3

WTT SURVEY

trained, with 3% being trained by the state extension service and five percent trained by the owner of the company, himself.

In asking how many full-time employees had passed a state or federal certification test for restricted chemical application, we got answers most often in the range of one to five. There was no pattern to the responses, however. Some companies would have no certified employees, some would have all certified, some had only a fraction certified.

Equipment value was projected to be $504,000,000 with a range of $200 to $4,000,000 worth of equipment owned by any one contractor.

Annual chemical expenditures are projected as $205,486,000 or roughly 22% of gross revenue. Annual equipment expenditure projections could not be made due to a lack of responses to this question. The varied periods of useful life of equipment also made such a projection unreliable.

Survey results were obtained by estimating the contract applicator market at a modest 4,333 firms.

	Small Companies		Medium Companies		Large Companies		Total	
EQUIPMENT	No. Owned	No. Plan To Buy	No. Owned	No. Plan To Buyd	No. Owned	No. Plan To Buy	No. Owned	No. Plan To Buy
Fixed Wing Aircraft	—	—	270	60	730	90	1,000	150
Liquid Chemical Applicators	4,360	760	1,600	210	6,600	240	12,560	1,210
Granular Chemical Applicators	3,640	360	1,790	120	1,500	270	6,930	750
Spray Tanks	3,060	1,060	1,640	60	2,240	330	6,940	1,450
Hose Reels	2,670	520	1,450	210	1,900	330	6,020	1,060
Complete Power Unit Sprayer	2,180	240	450	—	2,550	270	5,180	510
Pumps:								
Centrifugal	790	120	2,550	60	1,820	425	5,160	605
Piston	2,940	300	1,200	90	3,120	60	7,260	450
Utility Trucks	2,760	580	700	120	1,490	90	4,950	790
Tractors:								
8-12 H.P.	970	—	490	30	120	—	1,580	—
21-60 H.P.	970	—	180	30	1,360	—	2,510	—

Chemical Supply	Small Company Annual Purchases	Medium Sized Annual Purchases	Large Co.	Total
Dry Fertilizer	$33,000,000	$22,700,000	$ 4,000,000	$59,700,000
Liquid Fertilizer	8,800,000	3,800,000	6,600,000	19,200,000
Post Emergence Herbicide	13,600,000	5,500,000	36,000,000	55,100,000
Pre-Emergence Herbicide	5,170,000	7,300,000	16,500,000	28,970,000
Insecticide	12,900,000	4,700,000	17,400,000	35,000,000
Systemic Fungicide	350,000	354,000	175,000	879,000
Contact Fungicide	711,000	1,126,000	4,800,000	6,637,000

Small companies are those with an annual gross revenue of up to $75,000.
Medium companies are those with an annual gross revenue ranging from $75,001 up to $250,000.
Large companies are those with an annual gross revenue of over $250,000.

SMITH'S LAWN & TREE INC. RESIDENTIAL, COMMERCIAL CONTRACT APPLICATION

Three years ago, Smith Lawn & Tree Co., Inc., Kansas City, Missouri, was awarded the grounds maintenance contract for everything but the mowing at the Harry S. Truman Library and Museum at nearby Independence, Missouri.

"Not only because it's a big-money contract, we were happy to land this job for several reasons" said Jim McGee, president. "One, a job of this size puts us on our mettle to perform at peak levels of skill. In gunning for the ultimate in results, we must use the best materials and our best people. Two, it's the kind of prestigious showplace-type grounds maintenance project that is a feather in the cap of any maintenance outfit. You say a lot to a prospect when you tell him that among your jobs is the Truman Library.

Jim McGee (left), president, goes over the details of a job with foreman Keith Hubbard. Some landscape design is performed for commercial customers.

"In all phases — lawn, trees and shrubbery — the library job must be first-class," he explained. "Yet the problems are sometimes unreal. For one thing the library is open seven days a week and tourists are constantly strolling the grounds. That means we must exercise care in spraying. We have to spray on a piecemeal program, hitting the areas where there are no crowds when we can.

"In a job like this, as in all others, you follow safe spraying practices, putting materials on the grounds with minimum harm to plants, human beings and animals. We're a safety-oriented company and we've worked hard to earn a reputation for proper spraying."

In a discussion of the Truman Library account, which embraces seeding, spraying, fertilization, aeration and trimming on the 15-acre site, McGee stresses that, in the struggle to get everything ship-shape, sometimes something gets overlooked. His briefings to employees who work the library jobs stress the need to keep on the alert for any special problems, to employ preventive medicine.

But every-now-and-then something slips up and gets even a well-established 32-year-old company in a pickle. What happened at the Truman Library was that one day checking out the trees McGee spotted a heavy infestation of bagworms on a set of 40 foot Locust shade trees in

SMITH'S LAWN & TREE

"It is very essential to eliminate any communication gap between us and the customer" . . .

the parking lot. To remedy the situation, employees trimmed and pruned the areas in which the bagworms were attached.

"It's funny, and a source of embarrassment," said Mc'Gee, "but our people were so busy doing a good job trimming and keeping up the shrubbery and grounds they had forgotten to look up. But this is a learning process for our people and you can bet they'll look up from now on and spray before trouble occurs."

You won't find many such incidents in the tenure of the company. With a customer mix that runs about 80% commercial and 20% residential, the firm has enough repeat and referral business to keep the volume on a constantly high plateau. Among the jobs the firm handles year after year are some of the leading companies in mid-America — AT&T, Standard Oil Company, and Fairyland Amusement Park. There are retirement centers, hospitals and a cluster of city and government projects in the hopper.

The firm is strong in the tree removal facet and when a tornado struck Topeka, Kansas, a few years back, Smith's was called upon to tackle some of the toughest tree removal projects created by the tornado.

The business was started by McGee's mother as a lawnmowing specialty operation. Jim joined the firm ten years after it was founded in 1946. The company was incorporated in 1966. Growth shot up and continues to edge upward each year. What started as a $2,000 annual volume has been parlayed into about a quarter-million dollar business. Jobs range from 5,000 square feet to 25 acres.

McGee feels that the strength of the business is in its do-it-all concept, including crabgrass control, fertilization, and spraying trees and lawns against all types of insect infestations. Among recent customers are a number of home associations where treatments on parkways and islands are a main undertaking.

Tree spraying, trimming, and removal have long been Smith's specialties. The firm's equipment inventory includes a tree mover, stump remover, aerial platform-trailer (a $75,000 rig), log loaders and 12 trucks ranging from station wagons to 2½-ton vehicles.

For spraying the firm has 50-gallon and a 100-gallon fiberglass Myers tanks operating with gasoline-powered pumps and motors and a 300-gallon tank made by the Kim Manufacturing Company in Kansas City. The latter was custom-made for the firm, is built of aluminum, and builds up to 400 psi. It frequently doubles in brass as a root feeder.

In hand-picking the company's roster of chemical products, McGee says he has one over-riding guideline: Stick with the safest on the market. Included on the agenda are Sevin, Dursban, Dacthal, Dyrene, Dactonate, and Diazinon.

Only four people in the fulltime organization of ten employees are authorized to handle the spraying detail. They are licensed sprayers in the states of Missouri and Kansas. Kansas City sits on the border and licensing in both states is necessary since the firm has customers on both sides of the line. The Kansas licensing laws, according to McGee, are the most rigid and detailed and he thoroughly approves of them.

"In our company," he says, "we go to unusual lengths to follow safe spraying procedures on trees and lawns. It seems to be a tendency of sprayers to over-dose and we work on that problem. Yet I recognize that under-spraying can be a problem, too.

"In this area, we've had to battle the Elm leaf beatle the past four or five years and these are nasty little insects which cause severe defoliation of the trees. Sometimes there is a tendency to jump in and spray these trees with a chemical when merely hosing them down with water will alleviate the situation. The hosing-down treatment also works on aphids sometimes. We'll use it in place of a chemical if we feel it will get the job done."

Keith Hubbard, foreman, whose experience embraces stints with Lawnmaster, Inc., a chemical spray outfit, and managing a store of the Earl May Seed & Nursery for six years, is also a strong advocate of safe spraying practices. He feels it is important to exercise care in measuring the quantity of materials used, in establishing the application rate, and the pressure of the application.

He says: "With our company, it is standard practice to fully inform each customer of the treatment measures we're taking on his lawn, trees

or shrubbery. This applies to both commercial and residential customers. We want them to know exactly what materials we're using, why we selected them, any special problem they entail and, most of all, we want them to understand their role in achieving optimum results. That means making any followups that will help results.

"It is very essential to eliminate any communication gap between us and the customer," he believes. "We try to lay everything possible on the line to the customer. The tendency with some companies is to go out and lay down a spray, take off and then bill the customer. That's it. Sometimes they leave a written message in the mailbox giving brief information on the treatment. We want more than that — we want verbal dialogue so we can answer any questions the customer may have."

A stock of chemicals is purchased in the spring to kick off the season and the remainder is purchased on an as-needed basis for the rest of the year. Though he agrees he could achieve economy in buying by placing large pre-orders, McGee doesn't capitalize on it because he doesn't care to maintain large back-up inventories. The products are bought from four suppliers in Kansas City and any items needed can be delivered within one or two days or picked up in 30 minutes. The products are stored in a dry room with a locked door with warnings to stay out and "Poison" posted on it. "We don't want to experience any problems with fire or break-ins by keeping large stocks of chemicals," McGee said.

Both commercial and residential customers are billed once a month. Though some customers are serviced once a week, only monthly billings are made.

In pricing and estimating jobs, McGee says he simply computes the amount of space involved with the materials and arrives at what he feels is a reasonable fee. In many instances, he is able to eyeball the site and determine whether it runs 5,000 or 10,000 square feet. He points out that the space involved isn't always the key in estimating the price of a commercial job. Whether large equipment, which will permit handling the project more efficiently and quickly, can be moved in is a big determining factor.

Regular attendance of employ-

This 300-gallon spray tank, custom made for the firm by a Kansas City manufacturer, is rigged with motor and pump for 400 pounds of pressure.

...the tough one, for total vegetation control!

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- Gets most tough weeds and most brush others leave behind!
- Gets most tenacious vines, brambles and woody plants!
- Is remarkably resistant to leaching and lateral movement!

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For the past several years, SPIKE has been tested in actual field situations with commercial equipment. When applied in accordance with label directions, SPIKE will result in a high level of long lasting total vegetation control.

Test plot demonstrates dramatic result of single application of SPIKE. ▶

Durability!

Commercial field use has demonstrated that at recommended application rates SPIKE remains effective longer than most other products tested, and permits lower application rates in succeeding years. Long-term control prevents regrowth for extended periods of time.

Missouri test plot treated with SPIKE shows residual control 2 years later! ▶

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Five years of development and more than three years of extensive nationwide on-site testing in non-crop areas have proven SPIKE highly effective in the control of a wide spectrum of vegetation, including many of the so-called hard-to-control species. SPIKE effectively controls many tough perennials, as well as many woody brush and vine-type species that escape other control products.

Dead common mullein along right-of-way is a dramatic example of SPIKE's effectiveness on tough-to-control species.

Commercially-applied test plot demonstrates SPIKE's ability to eliminate persistent varieties such as Bouncing Bet.

Suitability!

Because of SPIKE's features

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- Gets most tough to control weeds and brush
- Gets most tenacious woody vines and brambles
- Is remarkably resistant to leaching and lateral movement

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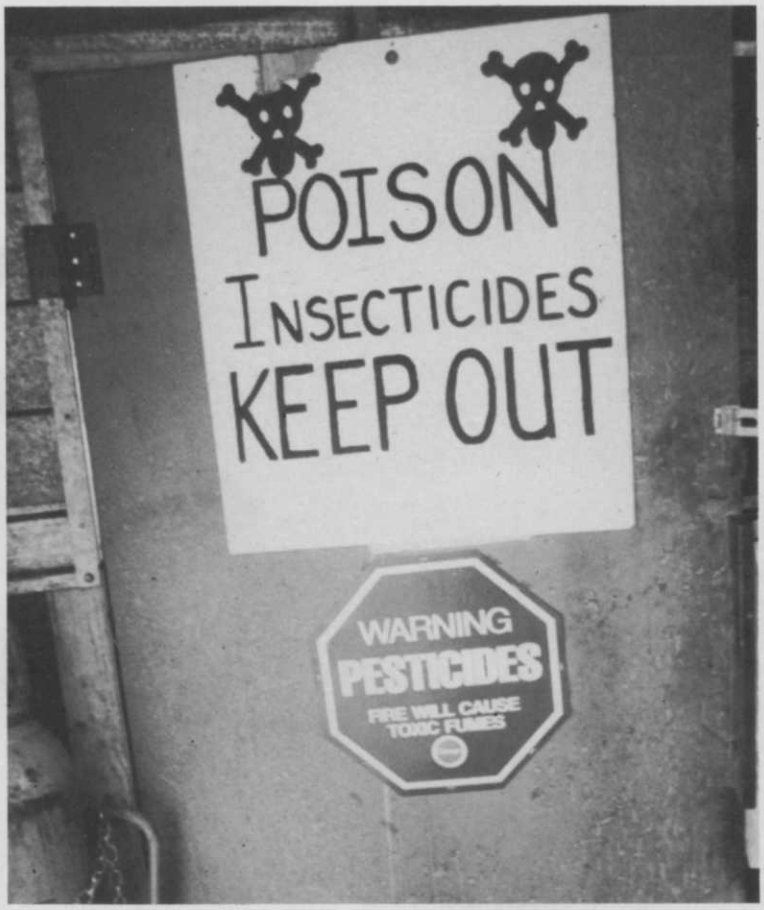
SMITH'S LAWN & TREE

ees at seminars, schools and other symposia designed to further their education is a key element in the McGee success formula. Four members of the organization, including Keith Hubbard, foreman, and Bill McGee, son of the owner, received schooling in arboriculture sponsored by Kansas State University. This qualified them as certified arborists in that state.

Test plotting is one of several services which has enhanced the firm's reputation with both commercial and residential customers, says Hubbard. He's a staunch believer in the value of marking an area off in squares, measuring them carefully, treating each with a different chemical, leaving one square untreated, and then making comparisons of the results obtained. He makes careful notations of the results, takes photographs at various stages and assembles a file on the plotting. It's a routine he follows frequently on both residential and commercial grounds.



Extreme care is exercised in handling all chemicals and the dry room in which they are stored is kept locked and posted to identify contents and eliminate careless handling.

A one-word sum-up of the potential for business in the Kansas City market, says Hubbard, is "fantastic." He added, "It keeps zipping up." The company's ability to perform comprehensive lawn tree and shrubbery care on residential and industrial sites offers a bit of oneupmanship over others in the field, he feels. He points out that the big tree trimming, removal and spraying equipment enables the firm to tackle jobs others lack the capabilities to handle.

"Word of mouth advertising helps keep the machinery busy for us," he said. "We got a new apartment customer the other day, we did his work and then a few days later recieved a call from another apartment owner who had been referred to us by the first one. A beautiful chain reaction is triggered when you do quality work." "The potential in this area is unlimited," Hubbard says. "We haven't started to scratch the surface."

Problems? One big one looms up prominently, says Hubbard. It centers on a labor situation. It isn't so much the shortage of good help that bothers him, he says, because he feels he could hire top professional people if he could afford to pay them decent wages. The problem he says, focuses on the matter of customer resistance to a level of fees that permit paying salaries to topnotch people.

"This is a hassle," laments the still-young Hubbard. "To stay competitive, we have to price competitively. That seems to mean we can't charge high enough fees to pay for good labor. That means we settle for something a bit under the best and that, in turn, means we have to do one helluva job of training our people. And that sure doesn't make this business any more fun. It's one of the big challenges, buddy, it really is."

The words get around that the firm is equipped with that big aerial platform rig and this leads to calls ranging from rescuing cats from the tops of tall trees to replacing light bulbs in the ceiling of the American Royal Building, one of the city's auditoriums. Answering these calls has made the company many friends.

"You'd be surprised how many city jobs dropped in our laps because we used that big giraffe to replace those light bulbs in the towering ceiling of that building," Hubbard smiles.

FLORIDA AQUATIC WEED CONTROL AQUATIC WEED CONTRACT MANAGEMENT

Aquatic weeds grow rapidly in a nutrient medium provided by surface run-off.

The following is excerpted from an interview with Tom Latta, vice president, marketing and administration, and Elroy Timmer, vice president of operations of Florida Aquatic Weed Control, Inc.

Timmer has 14 years of experience in aquatic plant management. He was a field technician for the USDA at the Aquatic Research Laboratory, and was involved with preliminary work in testing products now on the commercial market.

Florida Aquatic Weed Control, located in Ft. Lauderdale, was incorporated in March of 1974.

What are some of the typical kinds of equipment that you use?

We have one air boat, 8 john boats, five trucks, and three cars, basically for our salesman. Our trucks are all four-wheel drive, pickups with large tires suitable for driving on turf, four wheel drive, so they don't spin if they are trying to pull a boat out. Every piece of mobile equipment, truck or boat, has its own spray facility, essentially to maximize our efficiency. That doesn't mean that all pieces of equipment have the capability of putting on all types of formulations. We have two pieces which are dedicated to granular materials and we have others suitable for liquids, solutions, wettable powders. If we need a boat, we do not unload spray equipment from the truck and stick it on the boat, because you lose too much time doing that. Each boat is equipped with its own equipment.

How is your firm organized?

The organization of the firm is on a functional line. We have market-

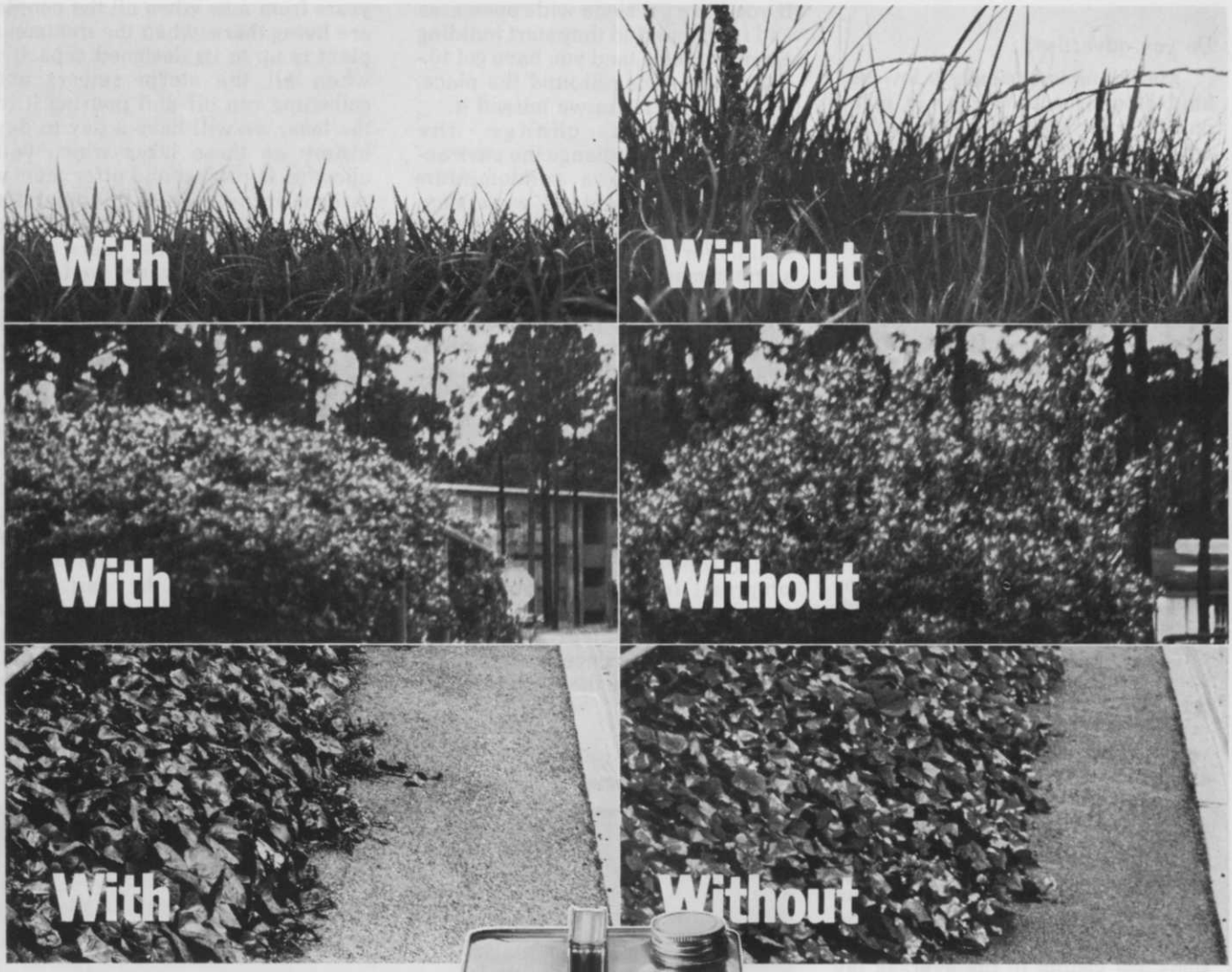
FLORIDA AQUATIC WEED CONTROL

ing, operations, and administration basically. Ninety percent of our business is not application per se, but what we call aquatic management. We do what is necessary, when it is necessary, to achieve the results that the customer wants in a way which is environmentally sound. Many of our customers are golf courses. Many of them are homeowners and associations, condominiums, where they have a need for a clean, healthy body of water. Many of our problems are different in degree, from the problems you may have in aquatics in Ohio or Michigan. We have a growing season which is 10 to 11 months a year, the water here is usually shallow, and it has a high runoff nutrient verdant.

The aquatic problems are pretty substantial. All this nutrient gets recycled right away into algae or plankton or microcites. Our problem is to find a way to accommodate this nutrient load. We try and push it into the fish food chain as much as possible.

We are spraying weeds, we are also trying to shift the balance of the nutrients flow from vegetation into either energy consumption by fish, or flesh, fish flesh and crustacean, all sorts of septic organisms. Spraying is an important part of our business, but we feel that the whole thrust of aquatic management is going to be moving away from just chemical applications towards a more integrated approach. I do think that the environmental and

Don't kill it. Control it.



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MAINTAIN effectively slows the growth rate of grass, shrubs and trees. That means less mowing, trimming, edging and pruning. And that means you'll be cutting down on maintenance costs.

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Canada: 234 Eglinton Ave., E., Toronto, Ont. M4P 1k5

ecological problems are accomodating all this nutrient that is discharged from rain water runoff, fertilizer runoff, and plant discharge.

Do you advertise?

Marketing is basically a low key kind of approach. We try to make ourself known. We do a very limited amount of advertising. We do a lot of calling where there is water, especially where there are problems, generally trying to make people aware of our capability. Once we do have some interest, we estimate in a very traditional manner what the aquatic problem is, look at the on-site condition — flow, depth, nutrient inflow, drainage area, the body of water it is receiving from, what weed conditions are there, and how hard they will be to control. In fact, before we even talk about control, we want to know what the use of the water is, what degree of control is desirable, and then how do we go about doing that. It may involve chemical treatment, mechanical message, biological control, although nothing so far has been particularly effective in the biological area. The white amur shows some promise at this point. Then we manage the process. Ninety-nine percent of our work is on long term contract. We are trying hard to maintain our position as the professional doing what needs to be done at the time it needs to be done, rather than letting the client call us to say we need to spray. The client basically is reacting to the visible signs of a lake problem and the lake problem is there before the signs are visible to the average lay person. So, we are trying to substitute our technical people with their perspective and get them inspecting what ever water is under management at frequent intervals to ward off future problems.

Are your able then to accurately forecast so that you know in advance what problems an area of water may incur?

Our contracts are one-sided basically. We commit ourselves on price and if the customer is unhappy with the quality of our work we just pull the plug. We have never locked a customer in. Our security is in doing a good job at a fair price. Usually we don't go long term right off the bat, we will go one year. After one year, with our history and knowing what is happening, knowing the hot spots, knowing what is going on then, we think we can reasonably project. If you have got some wide open area and in that period they start building condominiums, and you have got 10,-000 people living around the place, you bet your socks we missed it.

When you change the perameters, you change the environment. We have a condominium development where all work stopped in 73-74 and it is getting started again. For 2-3 years they had no aquatic management and they had no problems. We did a little bit of work there, just in the developed areas where there were some problems with fertilizing the lawns, etc. There was a lot of water and no problems. They asked us every so often what to do about it and we said nothing. Don't pay us — don't pay anybody. Now they are starting to develop again. The water is O.K. but they want to start getting everything under control We've given them a proprosal for a staged program so that the water areas can be brought into proper control position in parallel with the development plans as they open up the section. They will want lawns in, driveways, parking spaces, buildings, street lighting and water. So we are integrating our work with them. We're not going out on a tree here. We are taking it as, say, expanding the program. Two years from now when all the people are living there, when the treatment plant is up to its designed capacity, when all the storm sewers are collecting run off and pouring it in the lake, we will have a day to day history on those lakes which will allow us to project and offer them a three year program. At this point it is hard to tell just what the aquatic problems will be two years in advance. We do this where we feel we can do it with an acceptable degree of risk and where we feel the risk is small.

Because you are on these long term contract basis most of the time, are you on a retainer or consultant fee?

No, we are on a predetermined fee and we do what we have to do. Our cost fluctuates, heavier in the summer and lighter in the winter. That is the nature of the beast. We do not charge on a what we do basis because then it gets into a vast area of uncertainty, what did you do, and should it have been done, could we

Forsighted management could have prevented this problem.

FLORIDA AQUATIC WEED CONTROL

have done it cheaper, and that sort of thing. This way, on the long term fee the customer knows what it costs as much as three years in advance.

Do you maintain a large inventory of chemicals?

We maintain a reasonable inventory. We do not stockpile at the beginning of the year. We have not yet become involved in responding to early order programs. We have some opportunity but we are not in the distribution business. We go through distributors that service this area. While we maintain a reasonably inventory, for our own convenience, it is also for the convenience of our operations people. We may have 60 different chemicals. Chemicals such as adjuvants formulating aids, one thing or another, emulsifiers, but some 60 different items that we may employ. We don't try and maintain $10,000.00 of each of these. We do have to have it on the shelf when we need it, because we never can tell ahead of time what we are going to need. It all ties back to the nature of our business, which is aquatic management rather than government business. For example there may be a treatment scheduled for next May for 400 acres of hydrilla, where at this point you need so many gallons of chemical X and so many gallons of chemical Y so you purchase it in that fashion. We cannot anticipate our problems in that fashion because we don't get that heavily into that segment of the business.

What is the market potential for your firm?

That is a toughie. I would have expected that there be a pretty substantial market potential for people involved in aquatic management the way we approach it. There are quite a few people involved in spraying and I would say the market potential for spraying is kind of limited. There is accumulation of chemicals, most of the chemicals being used today are pretty well inspected as far as safety and environmental standards. There is a legitimate concern about indiscriminate use of chemicals in other states and Florida. We only operate in Florida with a minor amount outside. Other states we are familiar with are pretty strong minded as far as what techniques and chemicals should be used, and how they should be used. We don't always see eye to eye with all the state regulatory people. But I think that is the thrust, if we can find better ways of caring for water and the nutrient verdant we will all be better off. So I would say that the market potential for sprayers per se is limited to the degree that we are going to more of a management program.

What is the future of aquatic plant management in general?

Basically more of the same, more environmental concerns, legitimate concerns. More need to be perceptive and thinking about what is the impact of chemicals, what is the impact of biological control. The White Amur I think is a case in point. It eats weeds and converts it into protein and has a pretty good appetite for hydrilla. It doesn't seem to be effective in some other weeds. But, hydrilla is a major problem. If the fish, the Amur, can be used safely, I think it represents a significant aspect. We're looking forward to incorporating it. We are not answering the question of whether it is safe, from an environmental standpoint, as many people much smarter than we address that question. Florida has recently taken a first tentative step towards using the Amur. Nothing has happened yet, but the cabinet has approved a proposal which the Department of Natural Resources submitted for limited use of the Amur under closely controlled circumstances. That was just sticking their toe in the water, and if it works, I imagine the program will be an advantage.

Our concern is that proper inspection, management, and proper feedback of the field experience be assured, so that when we try this experiment we start developing something. We want to close the loop, so that the information gets back to professionals in a way that they can understand, digest, and in time find meaningful. I think this is fundamental. We are a little concerned about some of the regulations as they've been proposed because they do not give sufficient weight to this concern. I do think it is an opportunity. If the thing is environmentally safe, it will be a good, effective tool. We think it will be a tool that we can integrate into our existing programs and add one more string to the bow. I don't think it is going to answer it. I don't think it is a threat, because we don't look at ourselves as chemical sprayers. We look at ourselves as aquatic managers.

Does a government agency actually inspect your work on a routine basis or do they wait until problems develop?

There are three governmental agencies in Florida. Then there is the E.P.A. The three in Florida are the Game and Freshwater Fish Commission, the Department of Environmental Regulation, and the Department of Natural Resources. You should switch the order because the D.E.R. is concerned with pesticides and labeling, but once you're using approved chemicals and methods then they are not active on a day to day basis. They are active, for example, if there is a fish kill, or if there is a pollution problem or an oil spill. On a day to day basis we are governed by the Game and Freshwater Fish Commission and the Department of Natural Resources. They work hand in hand. They have slightly different jurisdictional responsibilitiies. There is a permitting system here where you can apply for permits to conduct aquatic operations, and that means anything, chemical, mechanical, biological, or dredging. Any form of aquatic control requires a permit. We apply for the permit and that is dated with the date of the expected program. Generally we take a look at the weed species that are there and the water usage and sketch out a program and then stay within our permit. If we need a modification of the permit, we apply for it. We provide a monthly report to the state that tells what we did.

It is easy to stay within their guidelines?

The guidelines are basically the label. The state has been pretty good about not coming up with a lot of trivial stuff. I have talked to people in the aquatic business in other states and some of them have to put up with an unholy amount of what I would call trivial. So, we can't complain.

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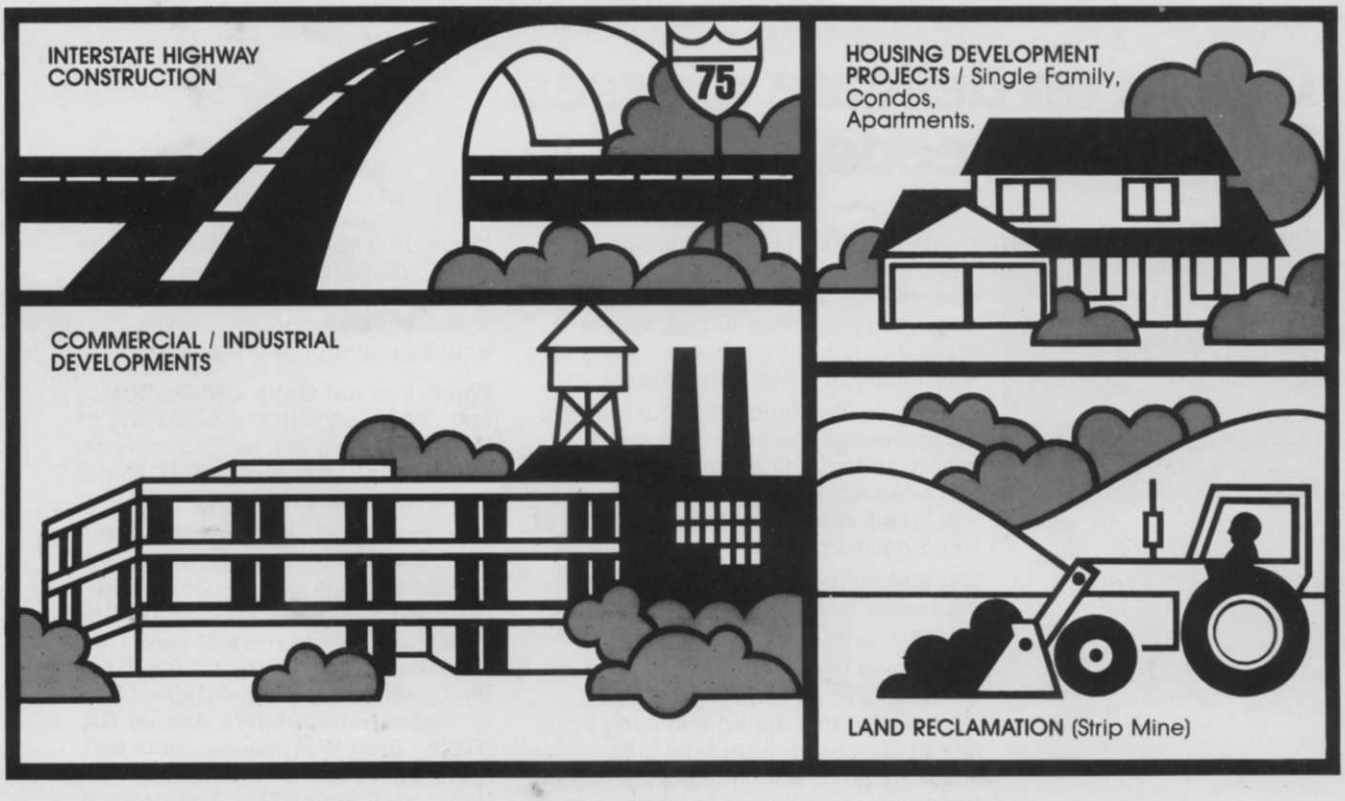
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FOREST CITY TREE: TREE PROTECTION CONTRACT APPLICATION

A roto-mist sprayer comes in handy, when more than one side of the tree can be reached with it.

William P. Lanphear has been an arborist since he graduated college in 1937. He was president of the National Arborist Association in 1971. He is immediate past president of the American Society of Consulting Arborists. He is a member of the International Society of Arboriculture, and the Ohio chapter of that organization. He is also a member of the Ohio Association of Nurserymen and the Cuyahoga County Association of Nurserymen. His company, Forest City Tree Protection Co. is located in Mayfield, Ohio, a Cleveland suburb.

Please describe your equipment inventory.

Forest City Tree Protection Co. has five sprayers in operation. We have a large roto-mist that we use in private and public work, whenever possible. We have two 600 gallon Bean hydraulic sprayers, one is a 60 GPM and the other is 35 GPM. We also have a 30 GPM sprayer. We use them for different types of spraying. For spraying elm trees we usually use the 60 GPM in conjunction with the roto mist. If we can reach the tree from more than one side, we use the roto mist, which is handy. If we cannot, we use a hose from the hydraulic.

What chemicals do you use?

We do other spraying than elm tree spraying. We do a dormant oil spray, which is mostly hydraulic. Then we go into foliage sprays for various problems. We also spray evergreens. We spray specialized things like hollies and magnolias, and crab apple trees for fungus. For the elm tree spray we use an emulsifiable concentrate. We use Methoxychlor, which is applied pretty strong. In the dormant oil we use the highly refined superior oil.

We also inject elms with Lignasan. Lignasan is a name, but there are trade names, one is called Elm Innoculate. We recommend that, but in addition to spraying and sanitation and all the other elm protection we recommend the injection. We haven't had much luck saving elms that are already diseased, unless it is minor, like 5%. Then we feel we can cut out the diseased portion, inject the tree and save it. If it is diseased in any amount more than 5%, it is pretty hard. We will inject it and try to save the elm if people want to spend the money to try, but with no guarantee whatsoever. It is like a cancer treatment, you try to save the patient, depending on the worth of the tree and the ability of the customer to pay for it. For routine care, we don't advocate it. If the tree is that far gone, you will probably have to take it down. In the prevention field, if the tree is healthy, we recommend spray and injections, and trimming out the dead wood and removing disease nearby. We do quite a bit of that. We also inject trees with the Mauget system of fertilizing and providing necessary elements. We have another injection system called Medicap. We don't have quite the problem in the Cleveland area which requires the use of Medicap because we have more of an acid situation. Where you have chlorosis due to a lack of iron or magnesium, we would use the Medicap injection.

We had an epidemic last year of cottony maple scale. That comes every once-in-awhile. We were pretty well pressed to do that. Every year some type of problem comes along.

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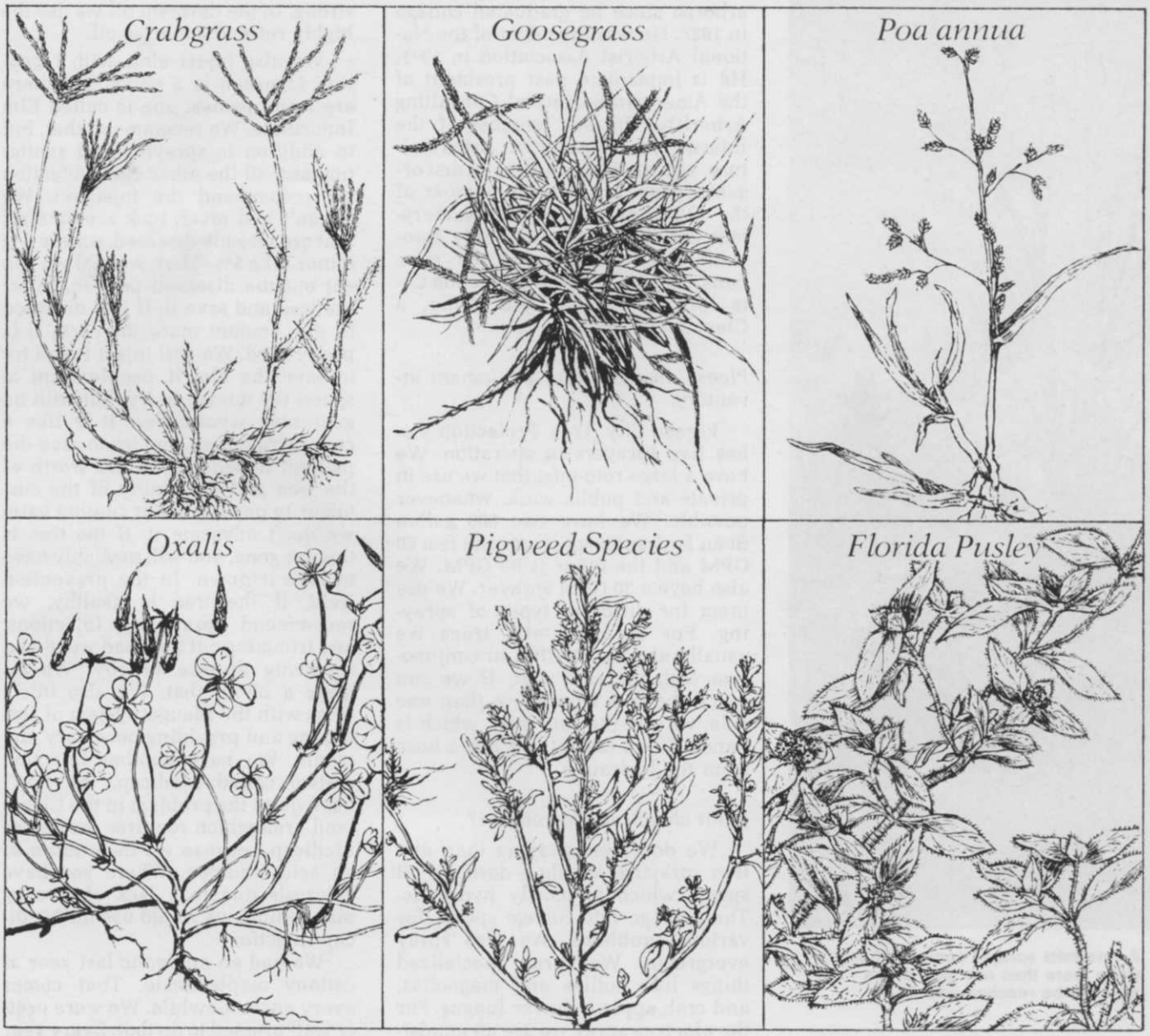
The preemergent herbicide that controls weeds for up to 120 days with



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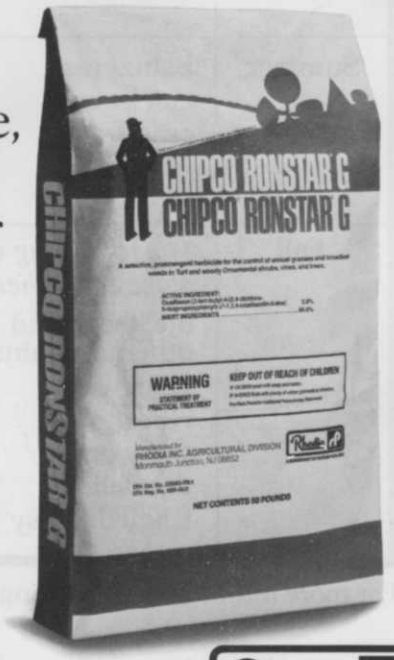

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Spring	*The following weeds can be controlled with one or more of the herbicides listed on the right:* buckhorn and other plantains chickweed clover curly dock	dandelion English daisy ground ivy knotweed red sorrel	speedwell stitchwort wild garlic wild onion yarrow	 Chipco Turf Kleen Chipco Turf Herbicide MCPP Chipco Turf Herbicide "D"
Summer	bahiagrass chickweed crabgrass	dallisgrass nutsedge	sandbur wood sorrel	 Chipco Crab Kleen
Fall	*The following weeds can be controlled with one or more of the herbicides listed on the right:* buckhorn and other plantains chickweed clover curly dock dandelion English daisy	ground ivy henbit knotweed lambsquarters mustards pepperweed red sorrel	shepherdspurse stitchwort speedwell wild garlic wild onion yarrow	 Turf Kleen Chipco Turf Herbicide "D" Chipco® Buctril® Chipco Turf Herbicide MCPP

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FOREST CITY

We seem to have a routine of birch sprays. We sprayed twice for them. And hollies. And we have a routine of spraying all we can with dormant oil. I like to get the aphid eggs and scale insects and those things. I think that's one of the better sprays and we encourage the people to do that.

They had an idea of using lady bugs from California on the cottony maple scale. Its true, lady bugs do eat scale, but from what I understand, from some of the experts, the variety that they shipped up here wouldn't do any good, especially the first year. What you should do is spray and release the proper type of lady bug the second year. Then they'll begin to eat the scale. The first time you get them here they go into hibernation. Another problem with that is that the people want to spray too soon. You don't spray the egg masses. You spray around the first of July or thereabouts when the eggs hatch out.

We use a lot of different chemicals during the growing season. We have used quite a bit of Benlate for fungus problems. We do some injecting with Lignasan. We use Prath chemicals quite a bit. We use Zygon and some of the other fungicides. We use specifics for each problem. We keep a large inventory of chemicals.

Do you keep a large inventory of chemicals?

We purchase large quantities of chemicals because we also sell them. We have not purchased our Methoxychlor yet for this year, but we purchase quite a few gallons of that, enough to carry us through the whole season. The main portion of it will be used in the spring dormant season. We will have enough left to do spraying at half strength in the summer. We also put on a dormant spray in the fall. We try to buy our material for the whole season.

An estimate of the total cost of our chemical use is hard to say. In checking our inventory before I left I found about $20,000 worth of chemicals. Some of those will be sold though. We are using more expensive chemicals now. It used to be you could figure the chemical end of it was a relatively small cost and it was mostly labor and equipment. Now Methoxychlor costs around $6, give or take a dollar, a gallon. For example, if you use a one-to-one ration

A high pressure hydraulic spray rig can cover the taller trees.

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Established by years of consistent performance.

Stop turf-damaging insects with the proven insecticide— PROXOL® 80 SP.

When you're responsible for turf playability season in and season out, you want management techniques and turf health products you can rely on. You want consistent performance. And that's why you should rely on Acti-dione® turf fungicides. They're a standard in the business. They have been for more than 20 years. And today there's still no evidence of fungus resistance.

In the spring, start your four-season spray program early before leafspot, dollarspot, or melting-out get started. Use Acti-dione TGF® or Acti-dione RZ®, alone or in combination. Both products are easy to use, economical, and attack fungi without killing bacteria that are helpful to grass.

As the weather turns warmer in the late spring, continue spraying tees, greens and fairways with Acti-dione TGF. Where brown patch is a problem, use Acti-dione® Thiram. Both products control the major hot weather diseases like dollarspot, melting-out, fading-out, leafspot, rust and powdery mildew.

You know how your tees, greens, and fairways look is a reflection of the care you give them. So give them the very best. Use Acti-dione turf fungicides. They're the standard.

TUCO

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in your mist blower in the dormant season, you have a high cost. The same with your hydraulic, if you use eight gallons and the cost is $6 per gallon, that is close to $50, or 50¢ a gallon for every gallon of spray you put out. If you spray a tree that takes a 100 gallons you have put on $50 worth of material.

How large is your staff?

I am the principal salesman. I don't have any other salesman or supervisors but we have crews. Last year we had six licensed spray operators. Every one that does the work does not have to be licensed, but we felt it wise to have as many as possible licensed.

Do you advertise?

We have been in business for years and we get a lot of business from recommendations. Also through the phone book. We then make our call to discuss what the needs are, survey the customer's property and advise them.

We mail a freight letter to our customers. We mail out a couple thousand. Some go to customers who were new during the year. They go on our general customer list and we send them our spray recommendations, along with a card they can check off. They may decide that they need other services that we haven't done before. In addition, we have regular spray customers who have been doing business with us for a number of years. We send them a confirmation letter telling them what we are going to be doing this year and what the price will be. If they wish to pay in advance, they can do that and get a discount. Those are routine customers. We have probably 300 or 400. We have our customers pretty well lined up. We also get calls over the phone for estimates. I think most of our business comes from established companies through recommendations.

Our total spray customers during a year's time is roughly 800, but some of those have one spray, some have numerous sprays.

How do you bill your customers?

I never ask for a deposit. We take the customer on faith. I don't check their credit, though if I had my doubts I might. Most of the customers that have spraying done are homeowners. You see what kind of set up they have, and if they want us to spray their trees, they are probably going to pay for it. We send a bill. When the work is done, we leave a notice. We bill for each spray as we go along. I don't demand cash in advance. We do send out our letter at this time of year, and we give a 10% discount if they pay by March 10.

Tree protection begins with proper planting of a healthy specimen.

What do you feel is in the future for your company?

Tree spraying is a highly trained field, and I think you have to be very careful in the materials you use. You have to be up to date and study the problems more than you used to, because you can't just go out and spray trees. You have to use approved chemicals, and they will become more and more limited. You can't just pick one of a whole lot of chemicals, you have to limit yourself to what is approved and what is labeled for that particular problem. That means you have to study a lot more, attend seminars, and educational sessions. You have to know what to use, there is no question about that. I thought 10 years ago that spraying would be diminishing and falling down, and in a lot of cases it has increased. Mainly because you still have the problems. They don't go away. Business has increased because it requires more effort. Maybe there are less people that are competent to do it.

What about competition?

There is a lot of competition among tree sprayers in the Cleveland area. There are quite a few companies. It depends on what type of spraying you are talking about, because you need different equipment to spray trees, tall trees that is, than you need to spray evergreens or bushes. I think a lot of the landscapers do turf spraying, and probably small evergreens, things like that, even though that is a different field than turf spraying. But they have to be licensed and know what they are doing. Some of those people are just spraying and doing it quick because they do not have all the information. You have to abide by the labels. You just can't mix up chemicals and go out and spray all types of evergreens.

There is a safe way of handling the pesticides. I am not an advocate of spraying everything that has a disease. A lot of times it is too late for spraying. A lot of times proper horticultural methods would solve the problem without spraying. I am not saying that spraying is needed at some time or another, because it is if there is a problem that has to be taken care of. We find we are still quite busy with spraying.

RAILROAD WEED CONTROL RIGHTS-OF-WAY CONTRACT APPLICATION

The following is excerpted from an interview with John B. Roy, president of Railroad Weed Control, Inc. with offices in Westfield, Mass., and Westerville, Ohio. Roy is currently chairman of the Public Relations Committee for the Northeastern Weed Science Society.

Railroad Weed Control, Inc. operates in a 23 state area east of the Mississippi River

How much equipment do you maintain?

Railroad Weed Control has 20 spray trucks. These are hi-rail trucks that spray weeds and brush along the tracks. In addition, we have four railway spray cars with which we form spray trains, using tank cars and chemical mixes. Our hy-rail trucks range in cost from $35-45,000 apiece. We try to maintain them for six years before the depreciation value becomes too great.

What types of chemicals do you primarily use?

We use chemicals from all the major suppliers. Our soil sterilants are from DuPont, CIBA-GEIGY, and Elanco. We use contact killers out of Vineland or Crystal Chemical and we use phenoxy herbicides for weed, brush and grass control out of DOW, Amchem and Velsicol. We use combinations of products in our mixes and we also use straight soil sterilants.

Spraying a railroad is a three-fold operation. A yard program is

A long stretch of railroad rights-of-way can be sprayed utilizing a railroad spray car and a train of tankers.

RAILROAD WEED CONTROL

primarily soil sterilants. The line-road program for weed and grass control is a combination of products, normally three: a soil sterilant, a contact weed killer and a systemic herbicide. Then, we use a phenoxy type herbicide for brush control.

How large of a staff do you maintain and what are the members primary functions?

We have approximately 15 full time people. Besides sales management, we also have supervisory people that handle the actual operations in the field.

We generally have one or two man crews on our trucks. Our preemergent program is all one man crews and our line and road program and brush program are all two man crews, sometimes three.

Do you actively seek spraying jobs?

We pretty much work with the railroad. We help the railroad program their vegetation control needs. Our suppliers, or major manufacturers of the products, make recommendations. Then we sit down with the railroad and try to work out a program that will meet their budget.

Because of our years of experience, eighteen now, we know pretty much who the railroads are, what they do, and what kind of programs they've had.

How do you estimate what a job will cost?

It depends upon the acreage the railroad plans to treat per mile, the seriousness of the problem, and how much chemical is going to be re-

A clean railroad yard promotes safety and efficiency.

Hi-rail trucks, ready to roll.

quired to eliminate or control that problem. We base it on how long the job is going to take, what it is going to cost, and where we have to go to do the job.

We're very specialized. We only do vegetation control, weed, grass, and brush, on railroads with our equipment.

How do you bill the railroads?

We normally bill on completion of each phase of the program. If a railroad has the yard program, it usually starts before the weeds start to emerge. When weeds and grass grow, we bill it upon completion of that program. If we have a large contract, we might bill weekly, on a production basis.

Line and road programs usually begin the middle of June and continue only into July. We do that in the same manner. It's billed by division, or region, each phase of the program. We handle brush control the same way.

When do you usually purchase chemicals? Do you keep large inventories?

We try to keep our inventories as low as possible, especially during the slow times of year, normally October through the first of March. Then we get the materials we need and bring it in as required.

What do you see in the future for Railroad Weed Control, Inc.?

We're trying to do more business with the railroads we're presently working with. In other words, a lot of these railroads don't have their budgets where they should be to take care of the problems with the railroad. The key is to have railroads do more weed and brush control.

Are there other problems particular to railroad weed control?

The Department of Transportation insists that railroads have a good visibility and safe operating conditions. Vegetation control is very important in that respect.

Is there much competition in this aspect of weed control?

There's a lot of competition in this area. There's probably seven major people in this business in the country. There's a number of smaller applicators.

DOT insists that railroads have good visibility and safe operating conditions.

A CONSULTANT CAN PROVIDE TECHNOLOGY

By Arnold H. Webster

His view point is un-arguable: "You have to know what you're working with before you can treat it." With this attitude Dr. W. D. Thomas, researcher, forest pathologist and consulting arborist holds an amiable and steady hand on "Forest-Ag Environmental Protection Service," his consulting and research firm in Lafayette, California. Seldom does he diagnose without a confirming isolation in his laboratory. That's why a property-owning customer can be confident that the guess work is taken out of diagnoses Thomas makes.

Other professional arborists and pest control operators consult with him (400-500 samples per year are run through the lab) and are given a written report to take to clients. This "strictly business" professional attitude, backed by thorough investigation before diagnosis, is almost like insurance for clients. They can show their customers they are backed by a resource firm with laboratory facilities.

"When we run into questions we can't answer, we tell our client so," says Thomas with the disarming frankness you immediately feel is one of the reasons people have confidence in him. "We check the situation with whatever tools we need — light meter, moisture meter, Shigometer — and take samples to test in the lab. If all this makes us pretty sure we have something new to the area, we report that to our client."

Sometimes the "unknown" furnishes an excellent opportunity for testing new materials. Almost always the home owner is glad to cooperate in learning what treatment can be made. By using their trees as test trees, and observing nearby untreated trees as checks, Forest-Ag can have nearly laboratory conditions for research. This kind of work done "in the real world" is definitely the sort to inspire confidence in the home owner's mind.

Steady clients receive a newsletter that tells them of new items in research (they get a kick out of realizing they're in the know on new things) and what problems they might be looking for concerning trees, plants, lawns in the coming season. They also receive research releases reporting current results of research, and information leaflets describing pests being encountered locally.

With a wildlife biologist on the staff, coupled with associates in hydrology, engineering, geology, entomology, and remote sensing, Forest-Ag reaches far — from environmental studies for public agencies to assisting home owners to renovate their landscapes.

Tree appraisals are becoming more demanding each year as clients are encroached upon by growing population pressures. An increasing amount of time required in court as expert witness often puts severe strain on research efforts.

Preventive maintenance of private properties remains the main thrust of Forest-Ag's efforts, but there is continuing and conscious effort to budget time allowing fifty percent for research — for commercial clients and in-house. Thomas feels that in-house research is necessary to develop information and techniques which will make possible better and unique service to clients.

Such in-house projects as climatological correlation of pest outbreaks for developing forecasting services, studies on the relations of rodent feeding and transmission of shade tree root diseases, biological agents for tree wound dressing, and the practical use of mycorrhizal fungi to suppress soil-borne diseases offer exciting breakthroughs in pest management.

He's working with an earthworm grower who sells the earthworm castings for fertilizer. Forest-Ag not only runs the tests to show the analysis of the castings, but studies the relationship of earthworms to the transmission of disease, thus performing two services at one time. Thomas' firm is unique in this way and unique in being one of few (so far as he knows) practicing forest pathologists.

"There are more trees growing in the U.S. now than when the Pilgrims came over," asserts Thomas. "And I'll bet you're going to ask me next why we have so much more trouble with trees than we used to?" "Well, there are, first, more trees. Second, they're growing under stress conditions from the day they are planted. Most trees are not native to where they are being grown. Indeed, they are 'exotic', and so have continual survival problems. It's only natural for trees to have more things happen to them under these conditions."

"That's why," he observes, "I encourage young people to become plant clinicians; partly because of our nation's increasing horticultural awareness, and because there is the obvious real need for people trained as plant pathologists, plant physiologists and arboriculturists. We greatly need more talented young people in forestry and horticulture."

"At the same time I advise such young people to not neglect learning about people, and how to express themselves while pursuing technical subjects. If the practicing specialist can't communicate with a client, the battle for 'green survival' could be lost." **WTT**

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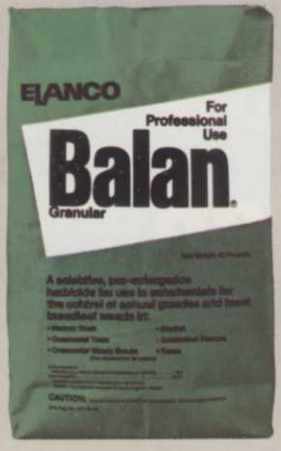

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PARTIALLY TREATED WASTEWATER SOLVES FLORIDA IRRIGATION PROBLEM

Water waste. It is well-known what will happen if the world continues to waste and abuse the dwindling supply of perhaps its most important natural resource — fresh, clean water.

The City of St. Petersburg, Fla. has a precedent-setting water reclamation project in which this wastewater, treated until it's nearly as fresh as it was when it first passed through household plumbing fixtures, is being used to irrigate golf courses, parks, commercial sites and street parkways.

Recycled wastewater, or "effluent water," first began flowing through a special 14-mile distribution system in St. Petersburg in November, 1976. Located in a region chronically plagued with a shortage of fresh water and surrounded by polluted saltwater bays, St. Petersburg took a bold step.

"We believe our water recycling system for effluent water is the first of its scope in the nation," said Timothy Thornton, of the engineering firm of Black, Crow and Eidsness.

"Our efforts are being carefully watched by a number of state and national agencies, including the EPA. The results we achieve may well influence the development of such systems elsewhere."

Thornton explained that city fathers realized some time ago that they had little choice in deciding whether to beef up recycling efforts of existing water supplies.

"The community is supplied water from three sources," he said. "Lakes and streams supply a small portion of water, as do subsurface fresh water pockets, though this source is dwindling because of saltwater pollution. However, all of the potable and most of the irrigation water comes from well fields more than 50 miles away."

He said that up to 40% of the potable water brought into the city from the outside has been used to keep areas green during the long dry season. "That's an abuse of drinkable water," he commented.

"We are left with one viable water source for irrigation — effluent water. The only dependable future water supply for irrigation is treated wastewater," Thornton added.

"Three years of research on wastewater purification yielded a process whereby the effluent water is almost as fresh as the city's potable water," said Thornton. The process makes the effluent water safe to use for irrigation and to be stored underground for future use through the use of deep injection wells.

He explained that residents were reassured that the effluent water to be used to irrigate much of the city's landscape is odorless, clear and not a health hazard. It is treated in much the same way as water to be used for drinking, though it retains its nitrogen and phosphorus content because of the value of those chemicals as fertilizing agents.

The spray irrigation system used to water parks,

One of four plants to be built in St. Petersburg to recycle wastewater for irrigation.

BEAUTIFUL ALL OVER.

0217® brand Fylking Kentucky bluegrass is beautiful in every way; brilliant green in early spring, consistent green in summer heat and long-lasting green into autumn. It has improved resistance to many diseases, drought, heat, cold, smog and traffic.

Low-growing, Fylking forms exceptionally thick-knit rhizomes and root system for a dense sod that helps resist weed invasion.

Now you can have a home putting green because fine-textured Fylking thrives on low-mowing (even as low as 1/2 inch).

This physically pure, genetically true seed contains no annual bluegrass (*Poa annua*), bentgrass, or short-awned foxtail.

Beautiful in price, too. Fylking Kentucky bluegrass seed costs less than most other elite bluegrasses. Ask for the Swedish beauty, 0217® brand Fylking Kentucky bluegrass seed when ordering at your local wholesale seed or sod distributor.

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U.S. Plant Patent 2887

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schools and golf courses was supplied by Rain Bird, said Thornton. Bank's Supply Co. supplied 90% of the equipment used on the job.

Thornton reports that public acceptance of the new program has been very good. "The good response is partly due to increased water availability and lower costs. Also, there will be no further release of effluent into the bay. That has resulted in a noticeably cleaner bay. The city also has done an excellent job of selling the whole concept to its citizens," Thornton explained.

Costs are down because nutrients are not filtered out of the effluent irrigation water. There are considerably greater expenditures required to refine these impurities out of water that is to be potable.

A recent legal decision regarding the distribution of wastewater reinforced the effluent water program. The Wilson-Grizzle Bill declared the Tampa Bay area a zero-pollutant zone. That meant that sewage water, no matter how well cleaned, could not be discharged into the surface water.

The city has four recycling plants located in four geographical quadrants of the community. The first plant modernized to perform the new tasks required a total expenditure of approximately $25 million.

This plant now has a maximum filtering capacity of 20 million gallons per day, up from the former eight million gallon capacity for potable water. Completion time for the project was three

One of the many outlets to the 14-mile distribution system for the recycled wastewater.

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years, though engineering design of the modernization was started before 1973.

Each of the plants is in a different stage of redevelopment. Each has a treatment facility distribution system and deep wells serving as back-up reservoirs for periods of peak water usage. A master control system is planned to eventually link all four plants. So far the first plant is the only one to supply effluent water along the special 14-mile distribution system and to successfully accomplish the goal of zero discharge of effluents into surface waters required by the Wilson-Grizzle Bill.

Funding for the project is being provided by federal and city monies. Thornton and his associates work primarily with the Public Utilities Department of the city. But on a day-to-day basis, they also work with individuals in nearly all levels of administration and management, from top administrators down to plant operators. Naturally, cooperation is essential.

"A Ph.D. sitting at a drawing board thinking up new systems must have practical input from the field people installing the equipment," said Thornton. "We're all in this together."

What does the future hold for the avant-garde St. Petersburg program? "We see a dual water system available some day," Thornton commented. "Residents and businesses will have one set of pipes at their disposal for potable water and another for effluent water. One system will provide drinking water at the present rate of about 60 cents per 1,000 cubic ft. with the price of effluent water at 10 or 15 cents.

Reservoirs like this one hold wastewater destined for practical use in irrigation.

"We've also been looking into ways to use the wastewater that's pumped into the ground. For all practical purposes, this is pretty good water. We're thinking of recovering that water, using solar energy as the power source, treating it to restore drinking water quality, and putting it directly back into the potable system. There might also be a

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way to put it directly in the water supply system from the treatment plant. Research is going on."

Thornton cited one very tangible by-product of the St. Petersburg project, large quantities of sludge left from the primary treatment of waste. This material causes no particular problems as it can be added to the green areas and used as an additive to commercial fertilizers.

A number of Florida contractors collaborated on the project. Included were Gulf Contracting, the Boyce Co., Tuttle-White and Lee Construction and Layne-Atlantic of Orlando. One of the spray irrigation contractors was Moore Golf of Culpepper, Va. Representing Bank's Supply Co., the Rain Bird distributor, was Dick Batchelor, sales manager, and John Swanson, irrigation specialist.

"We're pleased with the work these firms have performed," said Thornton. "This is more than a job, the whole community is backing it. It just doesn't make sense to spend so much money for water and then waste it when it could be reclaimed." **WTT**

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MICHIGAN TURF AWARDS

Above, James C. Lass of Caledonia, Mich., received the MTF Norman W. Kramer Outstanding Scholar Award. The award is shown being presented by Ward Swanson (right), Chairman of the Awards Committee. Below, Les B. Rutan is being presented the MTF Outstanding Student Award by James Smith (right), President of MTF.

Senior Paula Dietz of Michigan State University received the Bert Bradshaw Outstanding Student Award in Turfgrass Management from Gordon La Fountaine (left) and Bert Bradshaw (right) at the 48th Annual Michigan Turfgrass Conference last January.

Steve Vasher (left) and Dale Conzelmann (right) each received the TUCO Outstanding Scholar Award from Henry Lyons of the TUCO division of the Upjohn Company at the conference.

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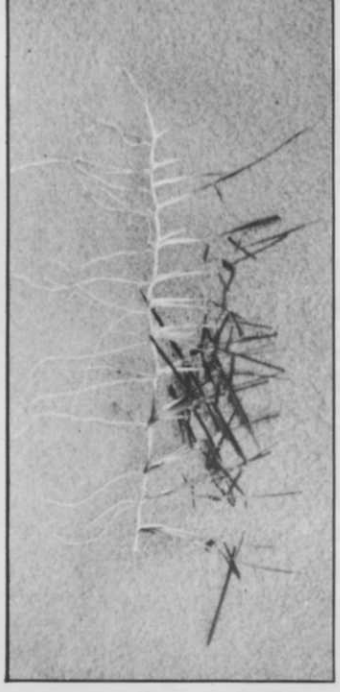
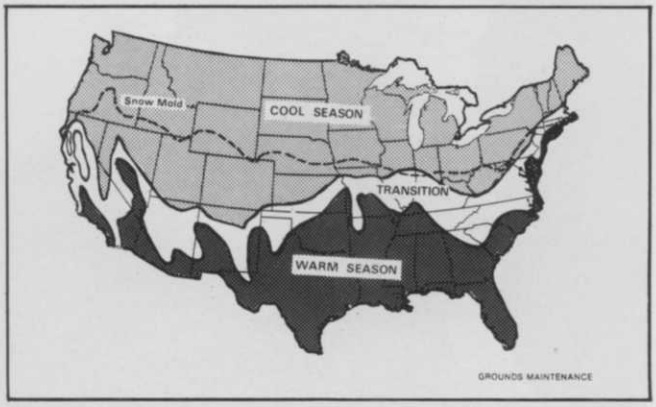
MANAGER'S GUIDE TO WARM SEASON GRASSES

By William H. Daniel, Ph.D., Department of Agronomy, Purdue University



Right: Zoysia runner from established sod. Below: Turfgrass zones of the United States.



Maintaining a warm season grass for warm weather periods and overseeding with cool season grasses to mask winter's dormancy is the current practice in many warmer climate areas. Bentgrasses, bluegrasses, and red fescues are being used in overseeding mixtures. New cultivars of bermuda, with more hardiness and vigor, plus longer lived perennial ryegrasses now available for overseeding, offer wide possibilities and new combinations for lawns, fairways, tees, and athletic fields. Annual ryegrass is used in over 90% of lawn overseedings.

Some advantages and disadvantages of overseeding with cool season grasses are:

Bentgrasses — good putting, good color, tolerant of extreme cold. Emergence and seedling growth rate slow.

Bluegrasses — *Poa trivialis* on greens, Kentucky blue on fairways, tees. Good color, slow growth. Putting surface poor.

Creeping red fescue — fine leaved, good putting, less frequent mowing, extremely resistant to disease. Expensive, dies out early, may leave bare spots.

Ryegrass — germinates rapidly, grows fast. Competes too much with existing bermuda, may lose color in extreme cold, susceptible to pythium, brown patch, and dollarspot, and when young thins rapidly when these diseases may be active.

In choosing a warm season grass the selection of species and cultivars should depend on the adaptability to environmental conditions, use to be imposed on it, and the level of management which will be provided.

The loss of chlorophyll in the leaves which precedes the onset of winter dormancy is related to temperature. Test results indicated that U-3 bermudagrass maintained normal color when the temperatures were 60° F during the day and 40° at night, or a minimum of 50° constantly. In contrast, temperatures of 60° days and 34° nights, as well as 50° in the day and 40° at night both produced discoloration.

Bermudagrass

Common bermudagrass seed is harvested in the dry southwest. This seed produces a relatively coarse textured, open, and fast spreading turf. The seedlings produced vary in texture and vigor.

The preferred time for seeding bermudagrass, *Cynodon dactylon*, is during the warm days of late spring; frost damage must be avoided. Seedlings produce stolons slowly and are favored by starting thin stands, but with ample nutrition. Optimum soil temperature for root growth of bermuda is approximately 80° F. The shade tolerance of common bermudagrass is poor.

After winter-caused dormancy, new growing points must be initiated from the dormant buds. This process depletes the stored nutrients in the rootstocks (hard white underground stems) so if a late spring frost kills the newly emerged tender shoots the next emergence of new growth will be limited and slow. Thus, late spring frost can be more critical than severe winter temperatures in actually weakening or killing bermudagrass.

All improved bermuda cultivars are vegetatively propagated. The limited availability and uncertain identification of stolons for a specific cultivar from the sod nurseries may be a limitation in local areas.

There are three classifications of the bermuda grasses as to their "cold tolerance" — poor, medium, and good.

Poor Tolerance to Low Temperatures. — This is the designation for the grasses that are suited for areas

Dr. Daniel is in the final stages of writing his new "Handbook for Turf Managers." The book has 39 chapters on topics such as Management, Grasses, Rootzones, Pest Control, and Turf Uses. The new book will be available from Harvest Publishing Co. this summer.

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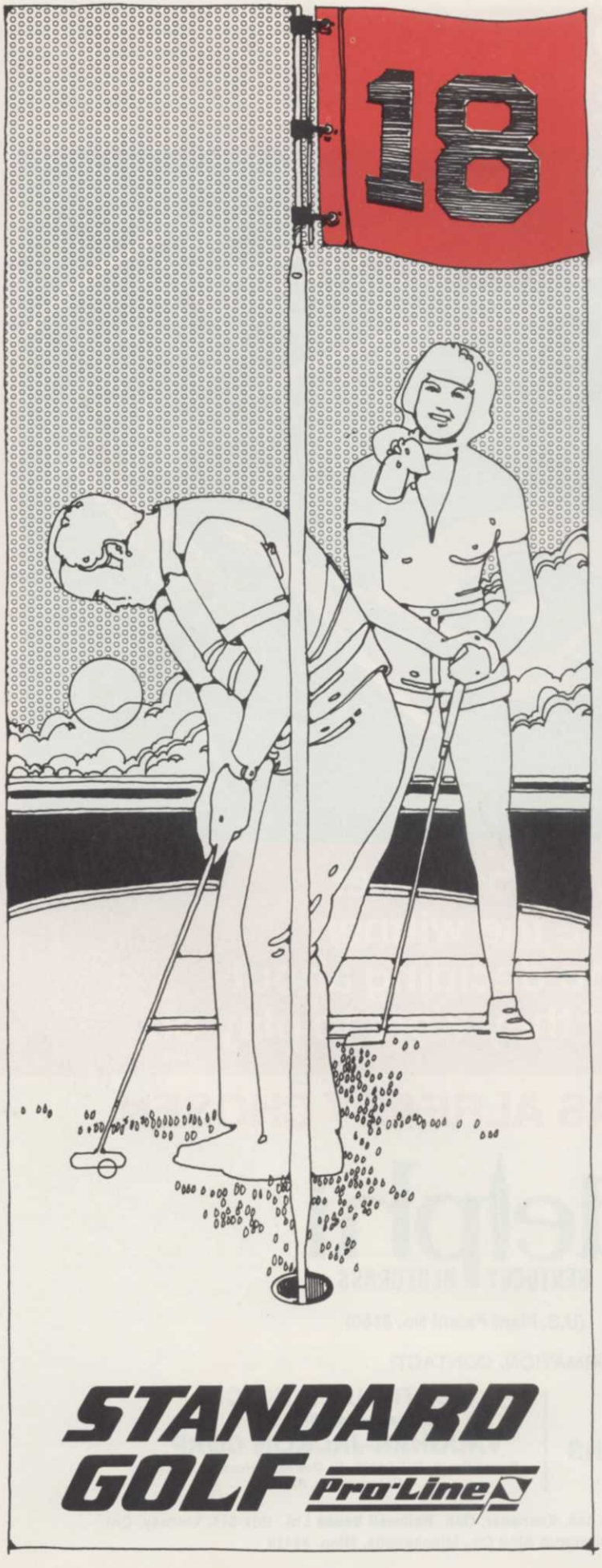

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with warm winters or with coastal influenced temperatures.

BAYSHORE,Gene Tift, Fla. 1945
A light green color, tends to be stemmy, rapid vertical growth rate, poor color retention in low temperature. Extensive seedheads, susceptible to pythium, some resistance to leafspot. Used on golf greens in coastal and island areas.

EVERGLADES, Fla. 1962
A medium dark green color, fine texture, vigorous extensive seedheads, low growth habit. Some resistance to leafspot. Used on golf greens.

ORMAND, Fla. 1962
A dark blue-green color, taken from a large clone in a fairway during 1946 by Roy Bair. Aggressive, prostate, medium density, minimal seedheads, susceptible to dollar spot. Used on fairways, lawns and sports fields.

PEE DEE, S. Carolina 1967
Mutant of Tifgreen, dark green, dense, fine-stemmed, turns purple, poor color retention at low temperatures, minimal seedheads. Used some on golf greens.

ROYAL CAPE, Calif. & ARS 1960
Dark green color, medium shoot density, early spring green-up, few seedheads, resistant to leafspot. Used for lawns in hot arid climates.

SANTA ANA, Calif. 1966
Seedling selected from Royal Cape in 1956. Deep blue-green color, high density, vigorous with good recuperative ability, free of grain, good spring and fall color, resistant to smog, salinity and wear. Used in coastal and warmer winter areas only. Used for lawns, tees, fairways, sports. Can be used in place of Royal Cape, Pee Dee, Everglades and Bayshore.

UGANDA, Grau USGA 1940's
Natural selection, *C. Tranvadinses*, light green, soft leaf, tends to be puffy, turns reddish-purple in cool weather. Requires high nitrogen; heavy thatch and repeated seedhead emergence. Largely has been replaced by other varieties.

Medium Tolerance to Low Temperatures — This describes a large group of medium textured cultivars. These seem adaptable for the deep south, as far north as Kentucky, Tennessee, Arkansas, and Oklahoma, provided the elevations are less than 1500 feet.

Good management includes the reduction of the nitrogen supply in the fall so the starches in the rootstocks can accumulate and provide for strong initiation of buds for spring growth. Annual soil loosening and vertical cultivation, which favors deeper rootstalks, can also assist in increased survival.

NO MOW, Fla. 1937
Dark blue-green, short wider leaf, short internodes, slow vertical growth, extensive seedheads, susceptible to leafspot and insects. Vegetative, slow to establish. Used in lawns and requires less mowing, useful in shade.

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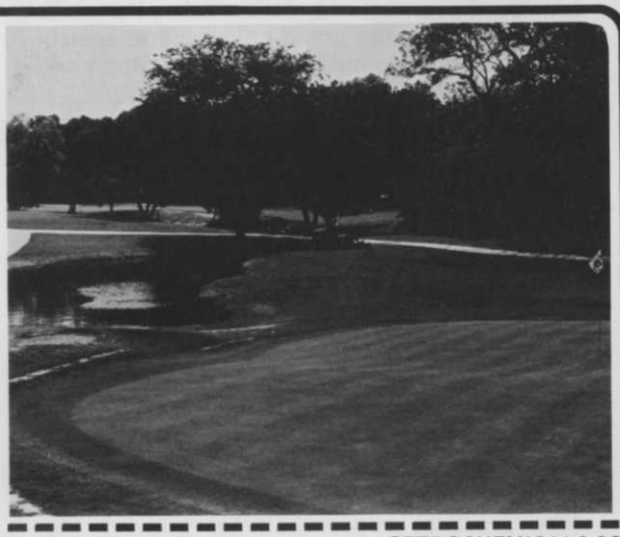

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TEXTURE IF, Texas 1957
Light green color, medium texture, dense turf, prone to heavy thatch, good spring green-up, intermediate wear tolerance, minimal seedheads. Used for lawns and sportsfields.

TEXTURE 10, Texas 1957
Dark Green color, medium texture, low growth habit, moderate spread, minimal seedheads. Used on recreation areas.

TIFDWARF, Georgia & ARS 1965
Third in series of putting green types released at Tifton, Ga., by Glen Burton and associates. Dark green color, fine texture, excellent low temperature hardiness, tolerates close mowing, requires good management. Susceptible to smog and pesticide injury. Widely used in putting greens.

TIFFINE, Georgia & ARS, 1953
The first of three releases. Excessive seedhead formation, prone to thatching, widely used, then largely replaced as putting greens in southern U.S.

TIFGREEN, Ga. & ARS, 1956
Second of three releases, dark green, very fine texture, soft wide leaf blade, good recuperative potential. Few seedheads. Widely used then mostly replaced by Tifdwarf selection for golf but Tifgreen is preferred for bowling greens.

TIFLAWN, Ga. & ARS
First of crosses by Burton to be released. Spreads fast, medium texture, drouth and wear tolerant. Requires less fertility than some. Susceptible to mite damage. Widely used as lawns and recreational turf.

TIFWAY, Ga. & ARS, 1960
Improved over Tiflawn, darker color, less seedheads, good spring green-up, prone to thatching, more disease and insect tolerant than most. Widely used on lawns, fairways, tees.

SUNTURF, Ala. Okla. 1956
Dark green, fine texture, vigorous growth, spreads rapidly, turns purple in fall, drouth and salt tolerant, few seedheads. Used on lawns and sportsfields and a few greens.

Increased Tolerance to Low Temperatures. — This has been the subject of research in Kansas, Missouri, Oklahoma, USDA at Beltsville, and elsewhere. The widespread happenstance establishment of bermuda has been the source of most collections. Ray Keen at Kansas State University has conducted extensive research in this area, and has released to cultivars — Midiron for athletic fields, and Midway for golf fairways.

The practical upper limit for growing bermudagrass is near the capitals of Kansas, Indiana, and Ohio, and eastward as far as New York City.

MIDIRON, Kansas 1966
Medium coarse, bright green color, vigorous and fast spreading, few seedheads and good sod density. Wear resistant, exceeds Tufcote in cold tolerance. Resistant to spring dead spot (observed in ten years of tests). Resistant to rust and leafspot. This open turf favors cool season overseeding. Used in fairways, tees and sportsfields.

MIDWAY, Kansas 1965
Superior low temperature hardiness, minimum thatching, intermediate texture and density, minimal seedheads, leafspot tolerant, susceptible to billbug, used in fairways and lawns.

TUFCOTE, SCS & ARS 1962
Medium green color, stiff leaf blades, low growing, susceptible to mites, few seedheads. Used for recreational and sportsturf.

U-3, USGA Gr. Sect. & ARS, 1947
Extensive testing was done by L. D. Hall and F. V. Grau. Dark grayish green, good wear tolerance, medium density. Susceptible to spring dead spot. Earlier widely used in fairways and tees.

WESTWOOD, St. Louis
Research started in 1949. Bluegreen, vigorous, medium coarse, low temperature survival. Used for fairways and athletic areas.

Following the severe winter of 1976-77 in Virginia the Midiron cultivar exhibited the greatest cold tolerance by producing a 75% 'green-up' coverage; Tifway produced less than 50% and Arizona common showed less than 10% coverage. Tufcote was slow to green-up and exhibited extensive spring deadspot. In some other tests, however, Midiron and Tufcote greened at about the same rate as Tifgreen. In the spring of 1976, Westwood showed more spring color (46%) than Midiron (35%).

Results of Bermudagrass Spring Green-Up in Missouri.

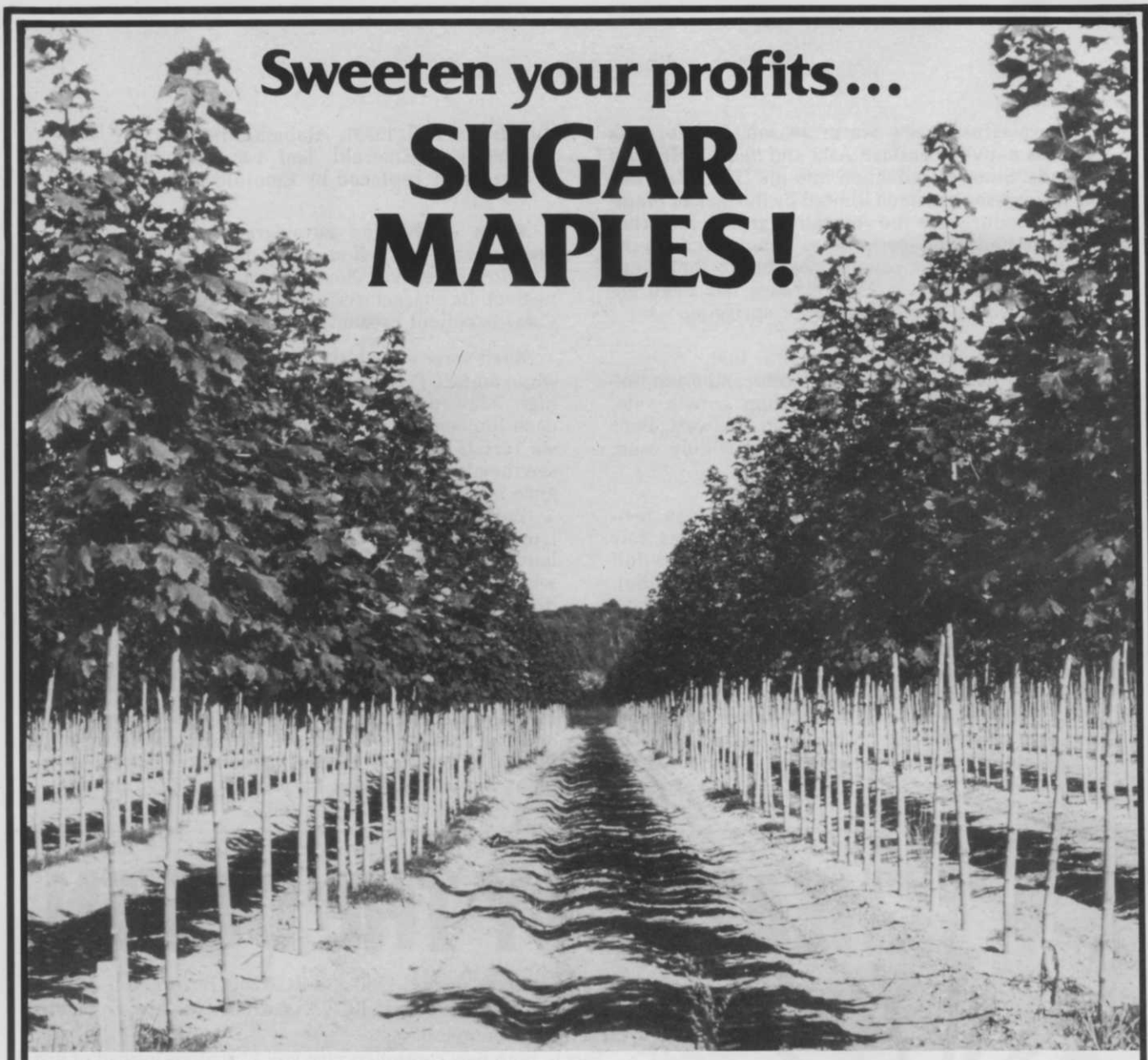
(Five year average).

Cultivar	%*
Midway	56
Midiron	48
Westwood	39
U-3	30
Tufcote	29

*The best individual plot in the test was 75%, the poorest only 6%.

Bermudagrass responds readily to applied nitrogen. Approximately 6-1-3 of N, P_2O_5, K_2O per square foot is recommended as an adequate annual maintenance level on areas that are irrigated and have clippings removed. The increased winter survival of bermuda in areas where potassium was added indicates that uptake of K before winter is beneficial.

It appears that a combination of the comparatively open Midiron bermudagrass and one or more of the new perennial ryegrasses would be a desirable turfgrass mixture for the transition zone. In the areas where bluegrasses have a reasonable chance for survival the combination of bermuda and bluegrass planting could be managed by cultivation, fertilization and overseeding to provide satisfactory performance as a dual combination turf. The Wabash cultivar should be adapted for this. The same applies to the more open Midwest zoysiagrass. Numerous overseeding mixes are used for winter color on fairways, greens, and lawns. A mix of Derby ryegrass and Highlight red fescue is one suggestion. Check with turf specialists in your state for current recommendation.



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Zoysia

Zoysiagrasses are warm season, sod forming grasses native to eastern Asia and nearby offshore islands. Since introduction into the USA, their use as turfgrasses has been limited by the lack of planting procedures for the vegetative growth material. The limited seed germinates slowly and young seedlings are poor competitors due to their very slow growth. Most zoysia increase has been accomplished by hand plugging or sprigging.

MEYER-Z-japonica, USGA & ARS. 1951
Meyer has a medium green color, medium texture (leaf 2-3mm wide) medium growth rate, dense sod, tolerates winters in midwest. Poor shade tolerance, thatch build-up, widely used, highly advertised.

MIDWEST, Z-japonica, Indiana, 1963
Coarse textured leaves, 3-5mm wide, open, faster spreading than Meyer, long internodes, low shoot density, less thatch buildup, good fall color retention (weeks longer than bermuda), not widely used.

EMERALD, Ga. & USGA, Green Sect., 1955
Z matrella-tenufolia cross, medium green color, fine leaf (1 mm), tends to be puffy, low growth, more tolerant to shade than Meyer, susceptible to dollar spot, slower than Meyer in spread, vegetative, tends to thatch, needs vertical grooming and close mowing, distributed in southeast.

Z-matrella, F.C. 13531, Alabama, 1930's
Similar to Emerald, leaf 1.5 mm wide, slow spreading, replaced by Emerald generally.

Once established zoysiagrass makes a very wear tolerant turf. If severely damaged, however, it is slow to recover. Zoysia has a high tolerance for neglect. Its characteristic rugged ground cover provides excellent erosion control.

Seed spikes of zoysia appear in late spring and when mature (Meyer variety) are four to six inches high. Mature zoysia seeds are smooth, slick and each fits very closely to the main stem. When zoysia turf is uncut the leaves grow up around the seedheads so they have little effect on the appearance of the unmowed turf.

Zoysia loses its color following the first heavy frost of the season; later than bermuda does. The leaves contain a series of fiber (vascular) bundles which are joined by thinwalled sections. During drouth the leaf structure allows the leaf to roll as the moisture becomes limited and reduces further water loss. During freezing the leaves shred readily so the leaves turn brown and remain so until late spring.

Meyer zoysia plugged into a bluegrass lawn on one foot centers will require two seasons to predominate. Spring is the most advantageous time to plant zoysia, but it can be plugged in any time of

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GSA Contract No. GS-07S-02545

Manufactured by Howard Commercial Turf Equipment, Inc., 9719 Olive Blvd., St. Louis, Mo. 63132

the year and still survive. Machines to plant plugs into existing turf have been developed by individuals, but are not available in quantity.

Because zoysia has a tolerance to atrazine as well as pronamide, annuals and cool season grasses can be controlled. Dollarspot, rust and leafspot diseases have been reported on occasion, but are not common in zoysiagrass.

In isolated cases, damage to older thatched zoysia has been caused by larvae of the billbug cutting the roots. This problem has not continued year after year.

Several entire golf course fairways are of zoysiagrass. Alvamar Country Club at Lawrence, Kansas, was planted to zoysiagrass when constructed. Old Warson Country Club, Meadowbrook Country Club, and Bellrive of of St. Louis have gradually converted to zoysiagrass. Danville Country Club of Illinois and Evansville Country Club of Indiana have had zoysia tees since the early 1970's.

Topdressing and verticutting aids in keeping zoysia tees tight and firm. The stiffness of the leaf blades provides excellent ball support. Mowing at one-half inch, or 12 mm, is recommended along with regular coring for topdressing and thatch dilution.

Many landowners planted a few plugs of zoysiagrass after they saw it advertised. Approximately three years later, they discovered they had large areas where zoysia was predominating.

Zoysia becomes green comparatively early because its growing points are already established while bermudagrass must produce new growth from dormant buds. Zoysiagrass may provide two additional weeks of green color in spring and fall than does bermuda grass.

Zoysia does best with close and frequent cutting and little rather than excess nitrogen. In areas where earthworms are present, their mounds of casts are stabilized by zoysia's strength and an uneven surface results. Where there are no earthworms vertical dethatching is recommended.

Zoysia's protected terminal growing points, durability, tolerance to chemicals and relative freedom from diseases are major factors in its acceptance. Its high temperature tolerance is greater than that of bermuda. In the transition zones, zoysiagrass is best adapted to open sunny areas, south and west slopes where summer use is most important, near south and west sides of buildings, on fairways and sunny tees, around sand traps and athletic fields.

St. Augustine

St. Augustine *(Stenotaphum secondatum)* came from the West Indies. It has become widely distributed in Mexico, Africa, Australia, and southern United States (zones 8, 9 and 10). It is well adapted to moist climates and coastal sands. Also it is the most shade tolerant of the subtropical

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*Proven in a 2-year study at Michigan State University. For a free copy of this study on nitrogen return, contact FMC Corporation, Port Washington, Wisconsin 53074.

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grasses. It is stoloniferous and so spreads readily. St. Augustine is planted vegetatively, as little seed is produced.

St. Augustine is extremely coarse textured with leaves 5-10 mm wide. It goes dormant in cold weather. Chinch bugs can become a problem when large populations are allowed to develop. Wintertime overseeding is seldom attempted due to its heavy thatch and coarseness. Where excess thatch and old sod are problems, removal and resodding or sprigging is the most satisfactory procedure. Most sod is cut from pastures or quickly developed on sod farms.

A St. Augustine Decline Virus (SADV) disease has become severe in some localities. St. Augustine grass frequently shows iron chlorosis and responds to applications of iron sulfate. Where adapted, it is used in lawns but seldom used on playing fields or athletic areas. In Florida, 46% of the lawns are St. Augustine grass.

"Bitter Blue," a common type, is the most frequently sold. "Floratine" is a natural selection released in 1959 by Florida AES. Floratine, a new release, is fine leaved, and is blue-green color. It has short internodes, low growth habit improved low temperature color retention, resistant to SADU disease and to chinch bug damage.

Bahiagrass — *Paspalum notatum*

Bahiagrass is limited to warm coastal areas. It is not as coarse as St. Augustine, but produces many coarse seedheads, so mowing includes seedhead removal. Under low level management, such as roadsides, it forms an erect open turf. It spreads by short, thick, flat stolons and shallow rhizomes.

Since bahiagrass is a prolific seed producer it is propagated by seed. Germination is slow and the process may continue over several months. Seed scarification by acid or machine can improve or speed germination. Seedlings develop slowly.

Along roadsides, on airport grounds, or in minimum maintenance areas, hydroseeding and mulching are preferred methods of planting.

The variety *Pensacola*, Florida, 1944, has narrow upright leaves and forms a dense sod. *Wilmington* has fine texture and the least seedheads of the varieties. *Argentine* and *Paraguay* are coarse and produce abundant quantities of seedheads.

Centipede

Centipede *(Eremachloa ophiuroides)* was introduced into the USA from south China in 1916 and has continued to do well in areas from Oklahoma to North Carolina.

The dense mat of this hardy, slow, lowgrowing grass tolerates neglect. The leaves a parallel on sides of stems and lie flat over the soil.

Centipede is sensitive to iron deficiency and gives positive response to iron sulfate sprays. Centipede is used in lawns, motel grounds, and

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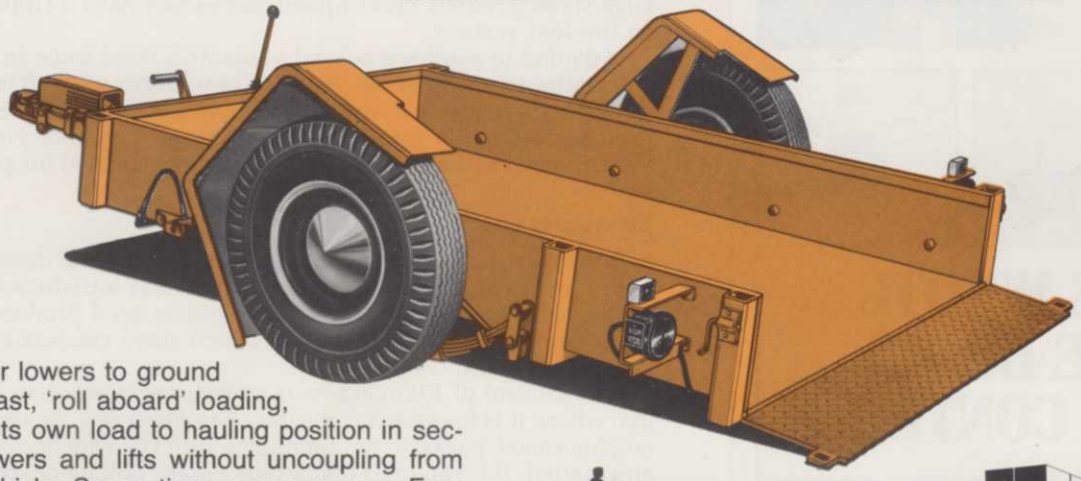

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areas that receive little use, because it is not wear tolerant.

Oklawn is a vegetative selection released by Oklahoma AES in 1965. It is medium textured, has improved drouth and heat tolerance and is adapted to partial shade.

Carpetgrass

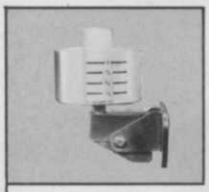
Carpetgrass, *(Axonopus affinis)*, forms a coarse-textured low-growing turf. It is light blue-green in color. The compressed two edge stems produce blunt tipped leaves that have a ripple midway on the leaf surface.

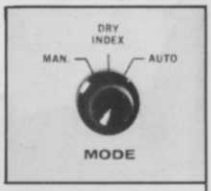
Adapted to southern coastal areas, it is used some in lawns for condominiums or in areas that receive minimal wear. It is useful on slopes and roadsides where maintenance is limited. Seedheads form so frequently throughout the summer that rotary mowing at less than two inches is desired if carpetgrass is used for park areas.

Kikuyugrass

Kikuyugrass, *(Pennisetium clandestinum)*, is a tropical grass found in Africa, Mexico and Columbia. It was introduced into California before 1920. Kikuyugrass is a sparse seed producer but the plant is extremely aggressive. Its pencil sized runners can extend across sidewalks.

The control of Kikuyugrass is considered a problem in California, where it is found as far north as San Francisco. In areas such as neighborhood parks it predominates quickly and becomes fluffy and matted. It is reported that a 1000 square foot patch expanded to two acres within ten years. Its persistent characteristic makes it a turf weed. Low mowing does restrict the plant's aggressiveness and make it somewhat manageable. **WTT**





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VEGETATION MANAGEMENT

By Roger Funk, Ph.D., Davey Horticultural Institute, Kent, Ohio

TURF

Q: *Please settle a dispute for me. I thought snow mold was just a cosmetic, short-lived problem and not really dangerous to the turf. A fellow lawn care operator said it can actually kill the grass plants. Who is right?*

A: Snow molds first appear as thick, cottony fungal threads covering patches of turf, usually conspicuous when snow is melting.

There are two common types of snow mold and, unfortunately, not all recommended fungicides will control both. If fungicides are to be used effectively, it is necessary to correctly identify the causal organism.

Gray snow mold is caused by the fungus *Typhula itoana* and related species. A snow cover is necessary for the development of gray snow mold and a deep, prolonged snow on unfrozen soil is ideal. The optimum temperature for infection is between 30° and 45° F. and the fungus is inactive above 65° F.

Gray snow mold appears in midwinter in lawns and other turf areas as roughly circular, bleached brown to straw-colored areas up to two feet in diameter. The infected grass may be matted together and have gray-to-black mold growth around the border. This is most often observed at the edge of receding or melting snow.

Another distinguishing characteristic of gray snow mold is the presence of hardened black fungal bodies (sclerotia) imbedded in the leaves and crown of infected plants.

Pink snow mold, caused by the fungus *Fusarium nivale,* is common in areas where prolonged periods of wet, cool weather occur from autumn to mid or late spring. Unlike gray snow mold, this disease does not require a snow cover for development. Conditions favoring pink snow mold include high humidity and temperatures of 32°to 60°F.

Pink snow mold appears as roughly circular patches usually smaller than gray snow mold. In cool, wet weather the bleached brown patches of matted leaves may be covered with a dense, whitish-pink mold growth at the borders.

The injury from both gray and pink snow mold is usually superficial, affecting merely the top leaves. However, the grass may be completely destroyed, particularly in poorly drained pockets or ravines having a deep snow cover, or when the snow is compacted.

Snow molds can be culturally controlled by avoiding succulent turf growth in late fall, by mowing at the recommended height as long as the grass continues to grow in the fall, and by limiting snow cover and compaction.

Raking out the matted, diseased areas in early spring will allow the crown to develop new tillers. Chemical controls are not effective in the spring but should be applied as the diseases appear in late fall or winter.

TREE

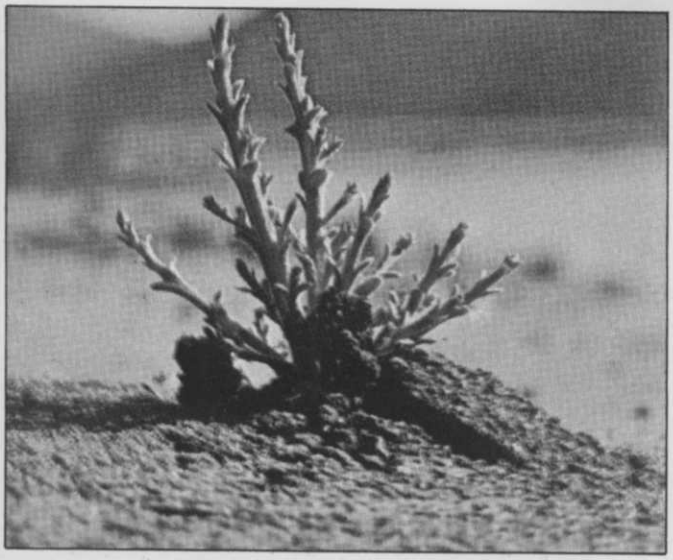
Q: *A customer of mine called about discoloration and cracks in the bark of his four-year-old crab apple tree. How can the cracking be kept to a minimum?*

A: Frost cracks are long, vertical separations of the bark and wood that may split open each winter. These cracks usually occur on the south or southwest side of young trees with smooth, thin bark. Sunscald causes areas of discolored, dead bark to form on the trunk or major limbs and usually occurs when a series of hot winter days is followed by a sharp drop in temperature.

Trees especially susceptible to frost cracks and sunscald include ash, beech, cherry, crab apple, elm, linden, London plane, Japanese and red maple, oak, plum, poplar, sycamore, walnut and willow.

Frost cracks and sunscald are best avoided by planting susceptible trees in protected, shaded locations. Wrapping the trunk with strips of burlap, white cloth or sisalkraft paper will offer some protection. A common and often effective practice is to apply a coat of heat-reflecting whitewash or tie small boards upright on the south side of the trunk.

VEGETATION MANAGEMENT is a free problem solving service for any residential, industrial, municipal, or golf course landscaping topic. Write your questions for VEGETATION MANAGEMENT on the postpaid reader question card in this issue.



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Many families today, whether living in a house, condominium or garden apartment, want at least a handsome lawn, trees, flowers and ornamentals. They want the *benefits*, but without the work of tending such landscaping personally.

While many enjoy puttering with vegetables or flowers, they tend to shun lawn chores that involve seeding, feeding, weeding, de-bugging. The do-it-yourself trend is giving way to a new lifestyle.

Today, more and more women are profitably employed outside the home, sharing routine housework. With resulting higher combined earnings, *these families can well afford professional lawn care*, as well as golf, tennis, boating, summer cottages and long vacations.

Thus, while this opens new vistas for the Lawn Care Operator, his work is certain to be fraught with difficulties, including keen competition. Naturally, the fittest will survive and prosper. Now, what does this mean for you, the Lawn Care Operator?

It means you must provide exceptional service: Superior work, using efficient methods, the best of equipment and products. Above all, you must avoid needless complaints, call-backs and retreatments. You simply can't afford to "fight fires" or handle needless complaints which tarnish your name, destroy profits, and waste time you urgently need to cultivate new business.

If you do your job well, your customers will stay with you; you won't have to re-sell them year after year.

The Gordon Turf Team can help you solve the single most persistant and troublesome problem of the turf industry — *weed control.*

Weed control will remain the thorniest bugaboo because weeds are *visible*. Failing to kill them brings costly complaints. In fact, you may have complaints even *after* the most thorough weed spray. The reason (and the cure) is crucial.

As you know, weeds don't magically disappear the same week you spray them. You know the best herbicides work slowly. But your customer may *not* know this . . . and that's the problem.

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Improved customer relations

Home owners who don't understand weed control often complain in panic, *"My weeds are still alive!"* We help you avoid such calls by providing an instructive door hanger. Left on the doorknob after each treatment, it explains Trimec's slow, thorough action, suggests patience, assures your customer his weeds are dying. This *advance* explanation stops many needless trouble calls, explains that you have indeed used the finest weed treatment available. A generous supply of door hangers is available with each Trimec order.

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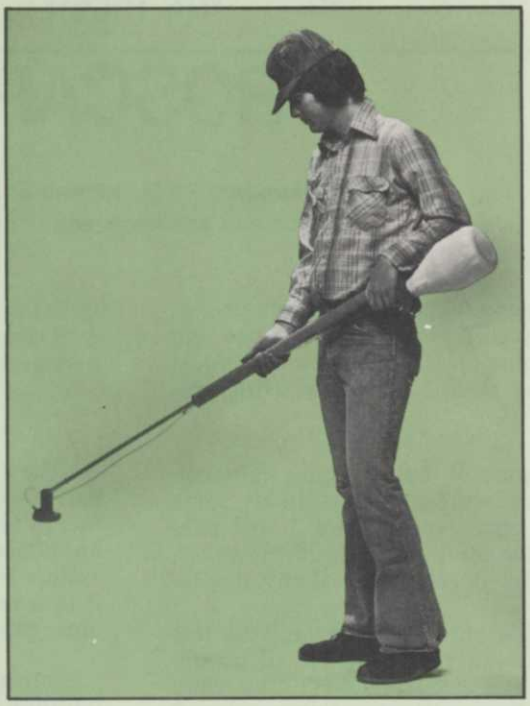

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Waterloo • Foster's, Inc.
Waukee • Baer Ag Supply
West Burlington • Brayton Chemical, Inc.

KANSAS
Kansas City
• Pest Control Supplies
• Rhodes Chemical Co.
Salina • The Landsco Corporation
Wichita
• Bartels & Shore Chemical Co.
• Champion Turf Equipment, Inc.
• Robert S. Wise Company

KENTUCKY
Florence
• George W. Hill & Co., Inc.
Louisville
• Bunton Seed Co., Inc.
• Ky-Inna Turf Supply Co., Inc.

LOUISIANA
Baton Rouge
• Gulfshore Turf Supply
• Wyche's Golf Course Specialties, Inc.
Covington
• Tammany Turf & Supply, Inc.
New Orleans
• Southern Specialty Sales Co., Inc.
Plain Dealing
• Wyche Golf Course Specialties, Inc.

MARYLAND
Baltimore
• Cornell Chemical & Equip. Co., Inc.
• Miller Chemical & Fertilizer
Landover • Vaughan Seed Company

MASSACHUSETTS
Newton Center
• Grounds Equipment Co., Inc.
Waltham
• Farm Bureau Coop Assn., Inc.
West Newton • The Clapper Company

MICHIGAN
Birmingham
• W. F. Miller Company
Detroit
• Terminal Sales Corporation
Grand Rapids
• Mollema & Son, Inc.
• Parmender & Andre
Hartford • Desco Chemical, Inc.
Kalamazoo • J. J. Dill Company
Royal Oak • Lawn Equipment
Saginaw • Burdick Seed Company
Taylor • Turf Supplies, Inc.
Traverse City • Fergusons Company

MINNESOTA
Minneapolis • Minnesota Toro, Inc.
St. Paul
• R. L. Gould & Company
• Turf Supply Company
Savage
• The Castle Chemical Co., Inc.

MISSISSIPPI
Jackson
• Southern Seed Company, Inc.

MISSOURI
Chesterfield
• Beckman Turf & Irrigation
Grandview • The Landsco Corp.
• Robison's Lawn & Golf Supply
Kansas City
• Bartels & Shore Chemical Co.
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• Crown Chemicals • Kitten & Bear
Springfield
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Billings • Turf Aid Dist. Company
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McCook • Cornbelt Chemical
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• Jirdon Agri Chemicals, Inc.
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• Leisure-Aid
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• Clark County Whol. Merc. Co.
North Las Vegas
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• Loft Seed Company
• Vaughan-Jacklin Corporation
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• All Best, Inc.
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• Farm & Golf Course Supply Co., Inc.
Phoenixville
• Lawn & Golf Supply
Pittsburgh
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• Krigger & Company
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• Woolfolk Chemical Works, Inc.

SOUTH DAKOTA
Sioux Falls • C & R Supply Company

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Sun Prairie
• Turf Management Supply

WT&T

PROSCAPE

By Michael Hurdzan, Ph.D., Kidwell and Hurdzan, Inc.,
golf course architects and consultants.

Q: *Are there any good textbooks or manuals that describe day-to-day golf course maintenance and management available on the market today? Most turf books do not deal exclusively with golf courses.*

A: Not that I am aware of, but that does not mean that there are none, and more than likely some readers may send some suggestions. I will pass them on to you in this column if they do. However, there is a reason why there are few, if any, day-to-day turf manuals.

Recently, Dr. Marvin Ferguson, golf course architect, Bryan, Texas, reminded me of an old quotation that said, "Seek to know WHY. The what, where, when and how will reveal themselves." This is the approach that most turf books and schools take.

One important reason is that every golf green, fairway, and course in general is different in each part of the country. Any combination of factors encountered on a golf course could be greatly different from those on a course right next door. These factors include soil types, surface and subsurface drainage, high sand greens or native soil greens, source of irrigation water, physical and chemical composition of the soil, turfgrass varieties used, amount of play, size of the budget, etc. As you can quickly see, the number of combinations of each of these critical management considerations is astronomical. It would take a large and brilliant book to answer all the questions for all the combinations.

This is why clubs hire a superintendent who has essentially devoted his or her life to seek the WHY and then is able to apply it practically to the what, where, when and how.

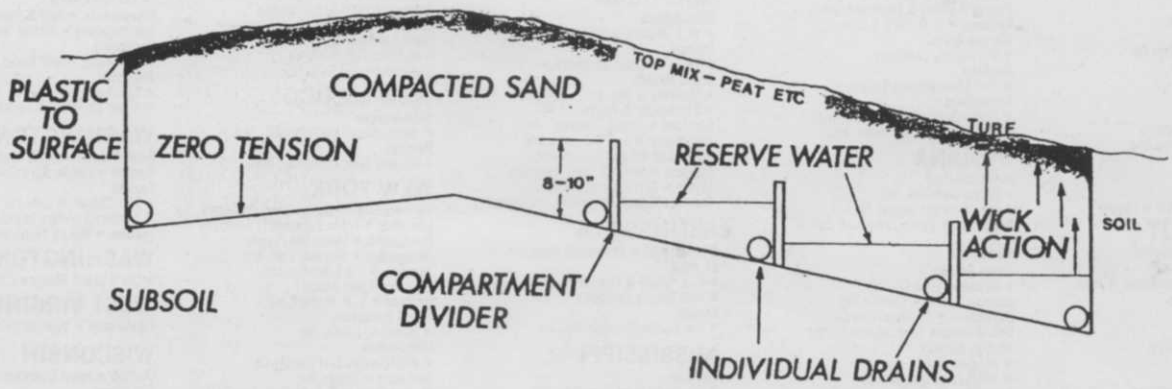
Q: *Is the PURR-Wick system of greens construction well enough established to risk construction of ten new greens using this method only?*

A: The idea of a golf green wicking water to the surface to supply the grass' needs is not new. In fact in 1916, F.W. Taylor was issued two patents on an almost identical system. The theory of the system is sound and Dr. Daniel's work has brought it to a level of sophistication that makes it much more practical than in the past.

However, the most important consideration in building a golf green is not the theory; but rather it is the experience, skill and integrity of your contractor, the estimated cost of construction, and your ability to adapt your maintenance procedures to the performance of PURR-Wick.

Your first step is to locate at least two courses with PURR-Wick greens and then take your greens chairman or committee members with you to look at them during the stress part of the summer (looking at them during good weather will not tell you much). Talk to the person charged with their care and find out what he thinks and how he manages them, and what they cost to build.

I have found men who say that the system is the greatest and I have found others who say that they must use three to four times more fertilizer, must still water the banks and fringes of the green, and the greens seem to lack built-in character in the putting surface. You are about to spend a great deal of money on something that is expected to last 50 years, so make sure it is exactly what you want.



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The best laid plans are often plowed.

When it comes to underground installations, the best laid plans often call for plows... Ditch Witch vibratory plows.

That's because vibratory plowing lets the installation be done without trenching. Power and communications cable even plastic pipe for irrigation or natural gas distribution often can be plowed in... with some big advantages to everyone concerned. The job goes faster... there's little surface damage to turf... restoration is almost eliminated. It all adds up to hours saved on every job which means you're dollars ahead.

Consider plowing instead of trenching in your planning. And look to Ditch Witch for the right vibratory plowing equipment... from compact service plows to rugged 100-HP-class models for cross-country work. Charles Machine Works, Inc., P.O. Box 66, Perry, Oklahoma 73077. TWX 910-830-6580. For the name of your nearest dealer, call Toll Free (800) 654-6481.

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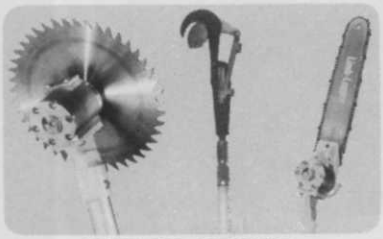
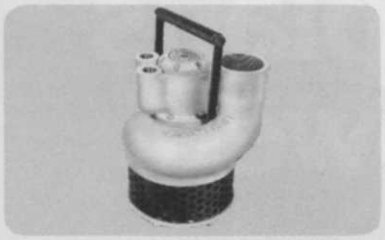
HYDRAULIC TOOLS

Save Time, Energy and Dollars.

Limb Lopper's power tools will make your maintenance operation faster, more efficient and reduce costs. Use them with existing hydraulic systems—digger-derricks, bucket-trucks or other mobile equipment, or portable power pack.



CUT OR PRUNE



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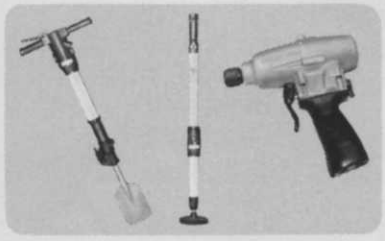

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Circle 107 on free information card

WT&T PRODUCTS

A new Flail Mower, with exclusive bottom sharpened, self-cleaning blades, has been introduced by the WOODS Division of the Hesston Corporation. WOODS Model FM72 Flail Mower features a dynamically balanced rotor for smooth operation, air-lift designed blades for clean, even cutting, an offset mounting for mowing close to solid objects.

Model FM72 cuts a 6 foot swath, and is designed for tractors rated at 30 to 60 HP, with 3-point hitch.

Circle 701 on free information card

The McMillen Division of States Engineering Corporation announces their new Rotadriver, a hydraulic-powered accessory that makes most farm tractors or utility vehicles perform like a pile driver. Rotadriver provides a unique way to utilize vehicle hydraulic capacity for driving wooden or steel posts up to ten feet in length. The operator determines the impact force of the 257 lb. weight for the specific job, and the unit quickly adjusts to plumb for hillside work. Maximum number of strokes per minute is 40. An attachment is also available for breaking concrete.

Rotadriver is designed to be operated by any three sizes of the McMillen Super-Combo Powerhead Series hydraulic motors as a power source. Mountings and hardware are available for three-point hitch (Category I, II, or III) front-end loader and utility loader applications. For added versatility, the same mounting bracket can be used for other McMillen accessories.

Circle 702 on free information card

Robark, Inc., manufacturer of specialized equipment for the sod production industry, has developed and introduced their newest product, the "NET SETTER." The NET SETTER lays and covers plastic netting for the harvesting of sod.

The installation of netting permits sod harvesting in less growing time and the use of less favorable soils as it acts as a binder to prevent the sod from tearing during harvesting, transportation or laying. Normal harvesting time can be cut in half.

As the net is being spooled off the roll it is simultaneously being covered with a thin layer of previously seeded soil, and compacted by a roller. Faster and more dense seed germination is demonstrated also.

Circle 703 on free information card

Backhoe-Loader 715B by Allis-Chalmers features a 65hp diesel engine, 7500 lb. capacity bucket, a

WHAT MAKES A GRAVELY RUN. AND RUN. AND RUN.

It's the guts of a tractor that make it run. And keep it running.

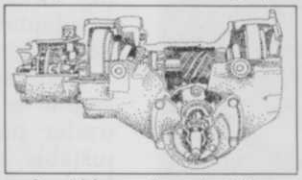
And no other grounds maintenance tractor has the guts of a Gravely.

THE STORY OF OUR LIFE.

Beneath a Gravely's impressive exterior, lies an even more impressive interior. Designed to give each and every Gravely a long and lively life.

The Gravely swiftamatic 4-speed transmission is a good example. Through years of performance, it delivers the precise speeds and power you need to do a lot of jobs a lot easier. And a lot better.

You get steady power at its lowest ground speed to handle the muscle jobs like snow removal. You also get a choice of three other speeds for mowing, hauling and other tasks.



Gravely's famous all-gear direct drive. A transmission with a lot of teeth in it

HANDLE WITH EASE.

The instant forward and reverse increases its maneuverability, while reducing operator fatigue. The controls at the operating position simplify and speed up operations.

THINGS ARE TOUGH ALL OVER.

Every possible part of a Gravely is built extra tough to stand up to year after year of hard, demanding work. The transmission housing and four-cycle engine are cast iron. The heavy duty tri-phase air cleaner eliminates excessive engine maintenance cost caused by poor air filtration.

ALL-GEAR DIRECT DRIVE.

The exclusive Gravely all-gear, direct drive from engine to attachments improves power transmission. And because it is all-gear, it eliminates belts which are prone to break, slip or wear out.

MORE REASONS OUR CUSTOMERS HAVE GROWN ATTACHED TO US.

A Gravely 2-wheel tractor operates 6 different mowing attachments alone. Other attachments are available for plowing, cultivating, snow removal and hauling loads. A Gravely also powers a seeder, sprayer, sweeper, compost shredder, scraper and even a log splitter. Enough to handle just about every kind of grounds maintenance job imaginable.

THE LAST TRACTOR YOU'LL EVER NEED?

How to keep your tractor from having to go into hibernation for the winter.

In addition to building tractors to last, Gravely wants its attachments to last, too. That's why most Gravely attachments are engineered to be completely compatible.

This protects your investment by making sure that most Gravely attachments will be compatible with both old and new tractors.

Which brings us to yet another reason our customers have grown so attached to us.

With as well as a Gravely performs, you won't want to replace it.

With as well as a Gravely is built, you probably won't have to.

GRAVELY

Clarke-Gravely Corporation
A Studebaker Worthington Company

Authorized GSA Federal Supply Schedule GS-07S-02447. HUD Contract Number, OAH (CO)m-2308.

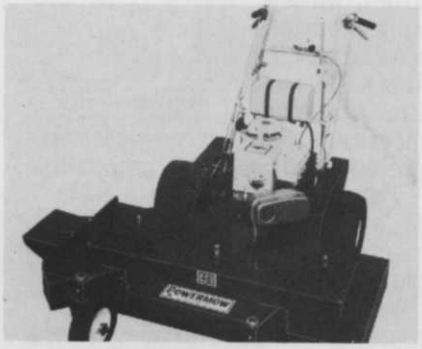
FOR THE GRAVELY DEALER NEAREST YOU, OR FOR MORE INFORMATION, CALL TOLL-FREE 1-800-528-6050 EXT. 280. OR SIMPLY WRITE TO US AT: GRAVELY, 0324 GRAVELY LANE, CLEMMONS, NORTH CAROLINA 27012.

one-piece frame and heavy duty front axle.

The integral one-piece frame has built-in mounting pivot points for backhoe and loader. A balanced design puts 25% of the tractor weight on the front axle, avoiding use of hang-on counterweights. The heavy-duty front axle is constructed of solid steel bar with yoke type spindles. It has a load capacity of 12,500 pounds.

A dual hydraulic pump system and easy-to-use controls provide smooth operation. The backhoe can dig trenches 14 ft. 8 in. deep.

Circle 704 on free information card

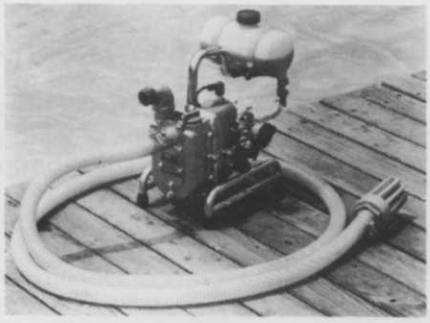


A new 48" heavy-duty Powermow has been introduced by F. D. Kees Manufacturing Company. Designed for both dependability and performance, the precision-engineered Model 48110 Kees Powermow features a powerful 11 h.p. Briggs & Stratton synchrobalanced engine and super low-tone muffler.

The Powermow's high ground speed makes it ideal for a variety of terrains. The operator is assured of positive maneuverability, with brake and power turning control levers on each handle. Other handling features include a fingertip clutch and individual drum-type wheel brakes.

The Model 48110 is equipped with V-flanged front deflectors to help prevent damage to yard decorations and monuments. The baffled frame design provides for clean, safe grass discharge. The engine deck and cutter housing are constructed of heavy guage steel to provide years of dependable use. The Powermow fits easily into a pickup truck for transportation. An optional riding sulky and large capacity grass catcher are available.

Circle 705 on free information card



The Green Machine portable pump — weighing only 14 lbs. but capable of delivering 32 gallons-per-minute — has been introduced by HMC, Torrance, Calif.

The new pump is designed specifically for marine, construction, home-owner and emergency fire-fighting uses where lightweight, easy storage and maximum porta-bility are required. A patented impeller system combined with a light-but-powerful 2-cycle engine provides a suction head (water) of 20 feet and a total delivery head (water) of 100 ft. Other features include reliable, self-prime starting, forced-air cooling and rugged all-metal frame. Overall dimensions are 11.4 x 7.5 x 13 inches.

Circle 706 on free information card

A new line of hydraulic sprayers has been developed by FMC Corporation, Agricultural Machinery Division, Jonesboro, Ar. The series of sprayers features a new pump available in 25 and 35 GPM models. Features include a one piece valve chamber for easy maintenance, stainless steel valves and non-wearing ceramic cylinder. The sight guage, pressure guage and large suction strainer are mounted on the front panel, allowing the operator to check all functions with one glance.

The sprayers feature 300 gallon hexagonally shaped fiberglass tanks that rest on channels welded into the box type frame. Spring tension straps hold the tank in place and a well surrounds the large filler opening to contain any liquid that is accidentally spilled. The tank is vertically cross-baffled.

The sprayers are avilable in engine or PTO models and with a trailer package. There are an adjustable height drawbar with ball hitch and high flotation wheels and tires. The sprayer is offered with a 28 or 40 foot stainless steel boom.

Optional equipment offered by FMC includes rollers attached to the frame of the sprayer for easy mounting or de-mounting in a pickup truck. Other accessories offered are hose, hose reels, guns and air blast attachments.

Circle 707 on free information card

Grasshopper offers an all new 52" mower deck width, complete with pneumatic tires on the guage wheels. Hydrostatically-powered drive wheels are now available with large flotation tires. The blade-activating clutch assembly has been moved to the operator's side for convenience and more positive engagement. A 16 hp fully-balanced Kohler engine, with hourmeter, is available to maintain Grasshopper's power-to-cutting-width ratio. The hour meter is optional on the original 12 hp engine which is still available for the 44" or 52" mower deck.

Quick mower deck removal and snowthrower installation is made easy with telescoping drive-shaft plus two-pin deck to mower attachment. A high back seat of sturdy metal frame construction places the operator directly above drive wheels for stability and added traction, as well as a totally unobstructed view of the mower deck.

Circle 708 on free information card

Heals wounds; prevents decay

Cabot's Tree Healing Paint is a carefully prepared bituminous paint for protecting live wood and preventing decay. Leading arborists and foresters have been using it for almost half a century. Here are the reasons why:

- **ideal for trees, shrubbery, etc.; seals, heals wounds, cuts, broken limbs, pruning abrasions.**
- **stimulates growth of new bark**
- **apply with brush or spray; produces a black, tough, elastic, quick-drying coating.**
- **excludes moisture; stops rot; prevents evaporation of sap**
- **may be used in any season**

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Pruner's Applicator Jar (4 oz. jar) **$1.10** each

Ship _____ cases (24 Applicator Jars per case) @ **$26.40** per case

Prices f.o.b. Boston less normal trade discounts

Circle 134 on free information card

GREEN INDUSTRY NEWS

Continued from page 12

as Nudrin by Shell Chemical Co., San Ramon, Calif.

Methyl bromide, a fumigant for soil and nursery stock, marketed by Great Lakes Chemical Corp., West Lafayette, Ind., as Bromo-O-Gas and Terr-O-Gas, and by Dow Chemical Co. and others.

Paraquat, a herbicide for non-crop and industrial weed control around shade trees and ornamentals, marketed by Chevron Chemical Co., San Francisco.

Picloram, a herbicide sold for non-crop use in brush control and for utility and other rights-of-way, marketed by Dow Chemical Co. as Tordon.

PESTICIDES

ICI is studying cause of clabber

ICI Americas Inc. has spent two years investigating the cause of clabber in aerial applications of pesticides. Clabber, which tends to be sticky and stream from spray nozzles, rather than spraying as a fine mist with even distribution, occurs in an "invert emulsion".

In a good sprayable emulsion, or an even distribution of water-in-oil, the microscopic droplets of oil are completely surrounded by water. The oil droplets are shielded from touching one another by the water. Because of this, the whole mixture acts just about like water.

In an invert emulsion, the water droplets are coated with oil. The water droplets are prevented from touching one another, and the mixture acts more like an oil.

ICI Americas offers a few simple rules for preventing clabber:

—Store concentrate in a cool, dry place. The lower the temperature, the longer the concentrate will last before it becomes useless for spraying.

—Protect the pesticide containers from exposure to water. If water enters a container use the contents as soon as possible. Check

Continued on page 104

DON'T CUT OUT QUALITY.

DO IT RIGHT, WITH STANLEY.

Quality, by our standard, is something which goes a lot further than making tools. To Stanley, it means: a full line of tree trimmers for every job; the best warranty in the business; complete parts backup; and distributors to help you anywhere in the country. It's also the efficiency, safety and dependability of hydraulic power. We don't trim on anything so that you're able to do your trimming faster. Stanley Hydraulic Tools: 3810 S.E. Naef Road, Milwaukie, Oregon 97222. Phone (503) 659-5660. Telex 360771. Write or call.

Circle 155 on free information card

suspect materials before using to make sure an invert will not form.

—Handle storage drums carefully to avoid drum lining failure and internal rusting, which speeds up aging of the contents.

Follow proper mixing procedures:

—Put water into the mixing tank first according to the recommended mixture ratio. At least 1/2 to 2/3 of the total amount of water must be in the tank before any other additions.

—Make other additions in the following order:

tank mix adjuvants
wettable powders or flowables
water solubles
emulsifiable concentrates and remaining
water to flush lines

If clabber does occur, ICI Americas offers the following recommendations:

—Agitate the mix thoroughly. Watch out for a pesticide concentrate layer forming at the bottom of the tank.

—Use chemical tank mix additives, 2-4 pints per 100 gallons of mixture. Do a small scale test before adding to the main spray tank. Tank mix additives include xylene, kerosene, aviation fuel, and ATPLUS 555 and ATLOX 8916TF (manufactured by ICI Americas).

—Add more water with agitation.

HORTICULTURE

Penn plant variety becomes cover crop

One of six new plant varieties developed within the Ag Experiment Station of The Pennsylvania State University, Tioga deertongue grass has been released as a conservation cover crop. The grass does not, however, compete well with cool season weeds and grasses and should be used on sites where revegetation is difficult and volunteer growth is sparse.

Tioga deertongue grass is more tolerant than most grasses of aluminum toxicity found on acid spoil banks in coal regions. Some lime and fertilizer are needed for deertongue grass to revegetate very acid, toxic, infertile sites. It is low in forage quality, unsuited for livestock.

Tioga deertongue grass was selected and tested by personnel from the Soil Conservation Service of the USDA and Pennsylvania State University.

IN BENTGRASS, IT'S THE ERA of EMERALD!

In days past Golf Superintendents selected Seaside . . . Astoria . . . or Highland because—when it came to bentgrass—that's all that was available.

Then came Penncross. This truly modern variety is a great turf grass. Its only serious challenger is proving to be Emerald (Smaragd variety), the entry developed by Sweden's W. Weibull from a single, superior progeny of Congressional (C-19).

Emerald deserves a second look. Some say it equals, or is better than Penncross in actual use. Here are just a few reasons:

- ☐ *Exceptional uniformity*
- ☐ *Excellent vigor—more vigorous than Seaside and slightly less vigorous than Penncross*
- ☐ *Disease resistant—no marked susceptibility to common turf diseases or customarily used chemicals*
- ☐ *Highly competitive pricing—superior quality and yet won't destroy a budget*

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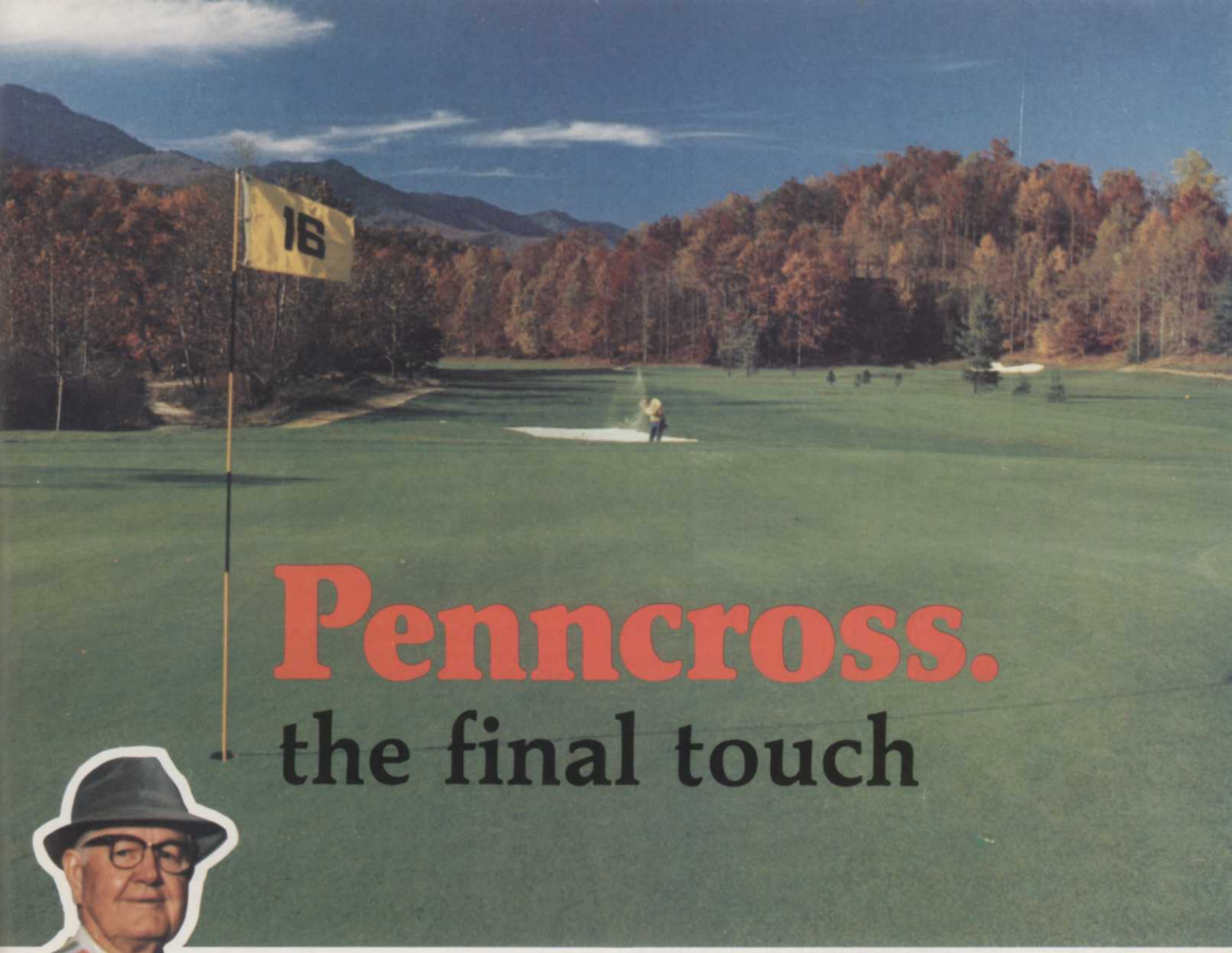

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EVENTS

Midwest Regional Turf Conference, Midwest Regional Turf Foundation, Stewart Center, Purdue University, W. Lafayette, Ind., Mar. 13-15, 317/749-2891.

Japanese Beetle Program Review Forum, Ramada Inn East, Continental Room, 3801 E. Van Buren St., Phoeniz, Ariz., Mar. 14., 202/447-6190.

Western Society of Weed Science Annual Meeting, Nugget Motel and Convention Center, Reno, Nev., Mar. 14-16.

USGA Green Section 1978 Regional Turf Conference, Washington Athletic Club, 1325 6th Ave., Seattle, Wash., Mar. 20, USGA, 201/234-2300.

Northcentral Pennsylvania Turf School, Holiday Inn, Bradford, Penn., Mar. 21.

USGA Green Section 1978 Regional Turf Conference, Sheraton Universal Hotel, 30 Universal City Plaza, Universal City, Calif., Mar. 21, USGA, 201/234-2300.

USGA Green Section 1978 Regional Turf Conference, Detroit Golfg Club, 17911 Hamilton Rd., Detroit, Mich., Mar. 21, USGA, 201/234-2300.

National Recreation and Parks Association Southern Regional Conference, Biloxi, Miss., Apr. 2-4, 202/525-0606.

Williamsburg Garden Symposium, Williamsburg, Va., Apr. 2-5, 804/229-1000 Ext. 2365.

USGA Green Section 1978 Regional Turf Conference, Marriott Motor Inn, Common-wealth Ave. at Rte. 128 & Mass. Turnpike, Newton, Mass., Apr. 5, USGA, 201/234-2300.

USGA Green Section 1978 Regional Turf Conference, Northridge Country Club, 6612 Falls of the Neuse, Raleigh, N.C., Apr. 6, USGA, 201/234-2300.

National Recreation and Parks Association Pacific NW Regional Conference, Yakima, Wash., Apr. 8-12, 202/525-0606.

American Horticultural Society Spring Symposium, Mills Hyatt House, Charleston, S.C., Apr. 9-12, 703/768-5700.

Pennsylvania Recreation and Park Society 31st Annual Conference, Downington Inn, Downingtown, Penn., Apr. 9-12, James G. Smith, 215/MU 6 1776 Ext. 49781.

ALCA Interior-scape Symposium, Hyatt Regency O'Hare, Chicago, Ill., Apr. 20-21, 703/893-5440.

USGA Green Section 1978 Regional Conference, Tarrytown Hilton Inn, 455 S. Broadway, Tarrytown, N.Y., Apr. 12, USGA, 201/234-2300.

USGA Green Section 1978 Regional Turf Conference, Kingsmill Golf Course, 100 Golf Club Rd., Williamsburg, Va., Apri. 13, USGA, 201/2342300.

Perlite Institute 29th Annual Meeting, Hotel Libertas, Dubrovnik, Yogoslavia, May 14-16, Robert Milanese, Managing Director, Perlite Institute, Inc., 45 West 45 St., N.Y., N.Y. 10036.

Canadian Land Reclamation Association Third Annual General Meeting, Sudbury, Ontario, Canada, May 29-June 1, Canadian Land Reclamation Association, Box 682, Guelph, Ontario, Canada N1H 6L3.

American Sod Producers Association Summer Convention & Field Days, Sheraton-Spokane, Spokane, Wash., July 19-21, 402/463-5691.

ALCA Reclamation/Erosion Control Symposium, Marriott Hotel, Denver, Colo., Aug. 3-4, 703/893-5440.

International Pesticide Applicators Association Annual Convention, Sea-Tac Motor Inn, 18740 Pacific Highway South, Seattle, Wash., Sept. 13-15, Ed Walters, 206/362-9100.

Professional Grounds Management Society Annual Conference and Trade Show, Atkinson Hotel, Indianapolis, Ind., Oct. 8-11, Allan Shulder, 301/6532742.

Florida Turf-Grass Association Annual Meeting, Sheraton Towers Hotel, Orlando, Fla., Oct. 15-18, 305/425-1581.

1978 Florida Nursery and Allied Trades Show, Curtis Hixon Convention Center, Tampa, Fla., Oct. 27-29, Charles W. Dunn, 813/626-4149.

Eighth Annual National Institute on Park and Grounds Management, Regency Inn, Denver, Colo., Oct. 29-Nov. 2, 414/7332301.

ALCA Maintenance Symposium, Mariott Hotel, Kansas City, Mo., Nov. 9-10, 703/893-5440

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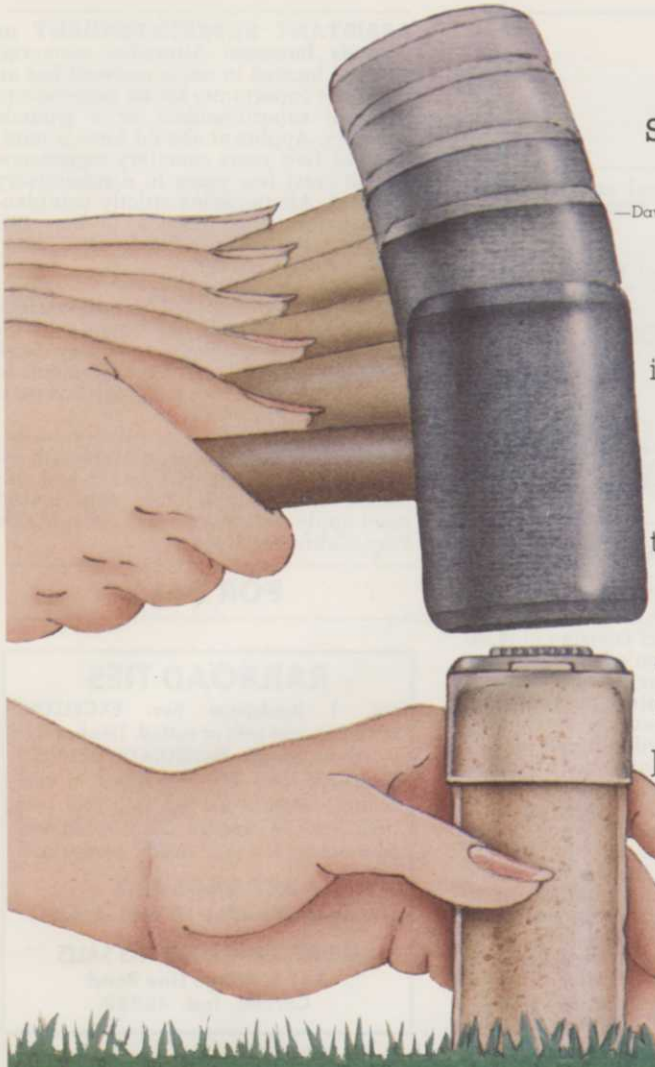

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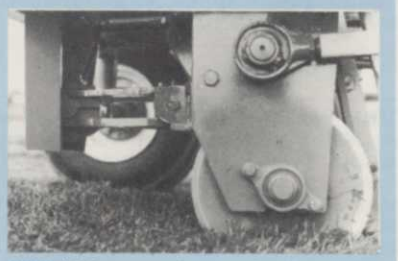

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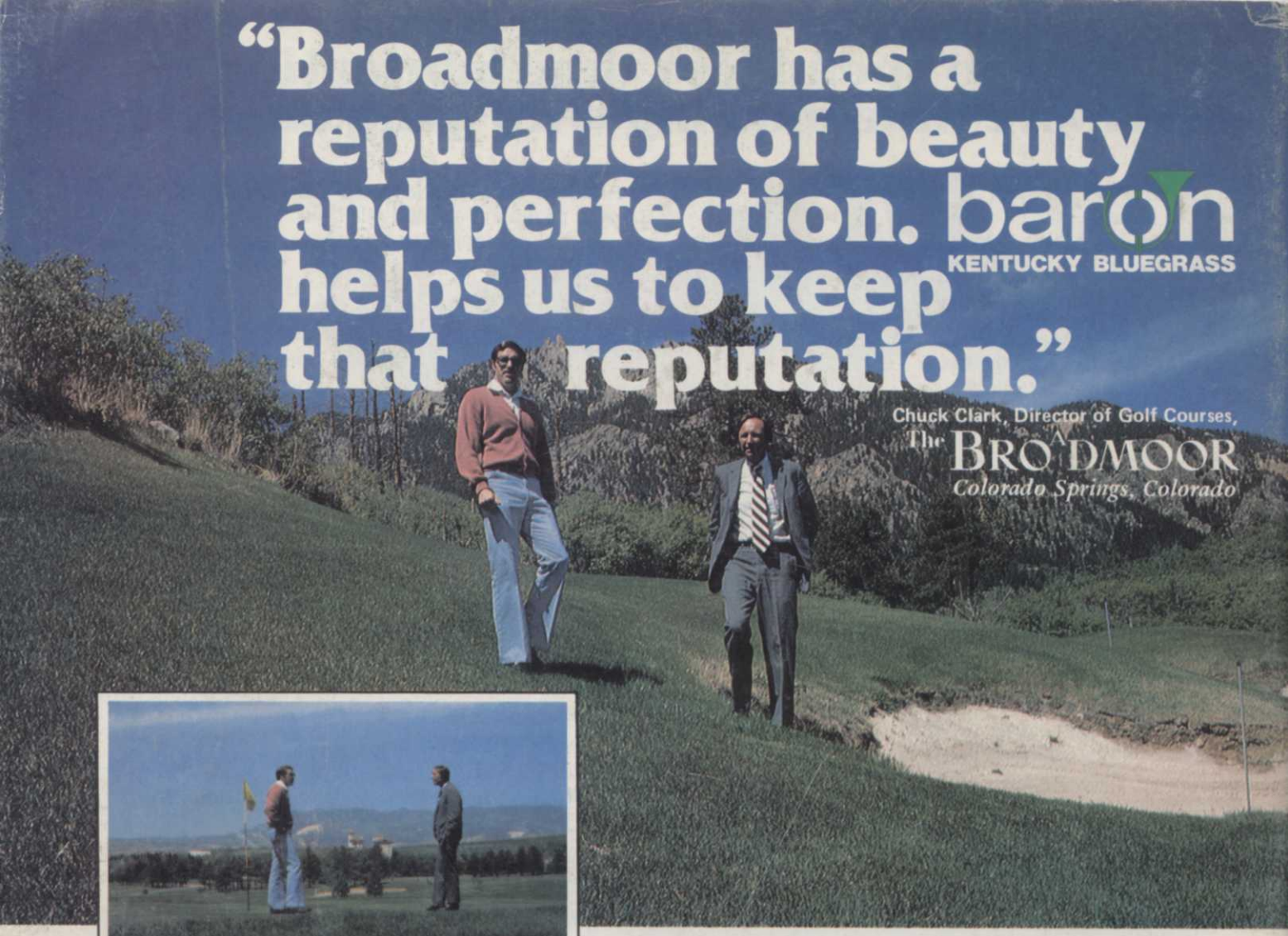
KENTUCKY BLUEGRASS

Chuck Clark, Director of Golf Courses, The BROADMOOR Colorado Springs, Colorado



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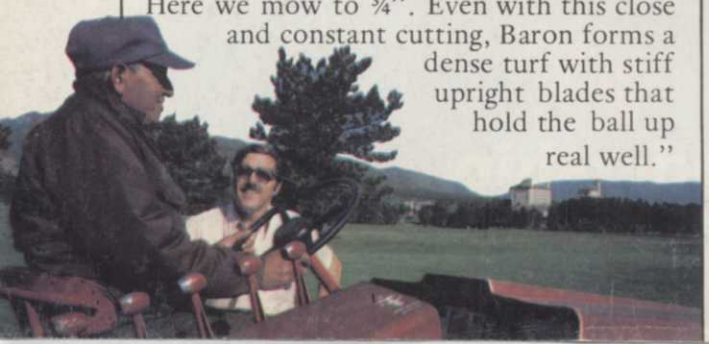
"We use Baron on all of our collars. Here we mow to ¾". Even with this close and constant cutting, Baron forms a dense turf with stiff upright blades that hold the ball up real well."



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"Because Baron proved itself on our new South Course*, we're using Baron in our overseeding program on our two other courses. Baron's proved itself at The BROADMOOR. We are currently using Baron for all 54 holes."

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*The South Course at The BROADMOOR was designed by Edwin B. Seay with Arnold Palmer as Consultant.

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